

**All you want to
know about the
BBC MICRO!**

THE MICRO USER

Volume 1
Number 5
July 1983
£1

WIN



**Epson's latest
£500 printer**

**STRIKE
LUCKY
with
TENPINS**

Learn about loops

Kill those cassette bugs

Fight the alien SPACE PODS

Make the most of your user port

We test Wordwise and FX-80

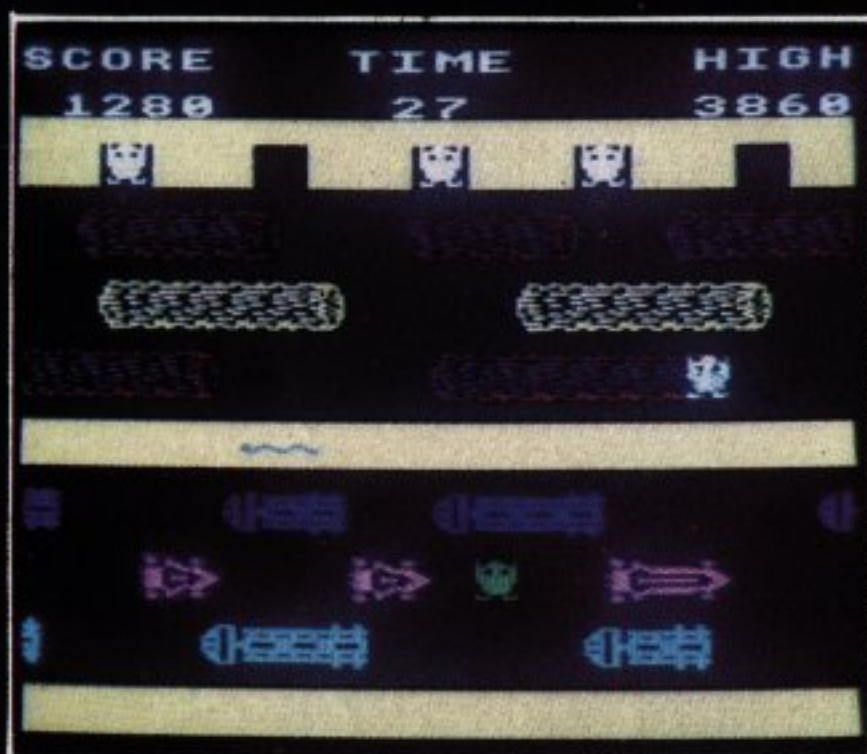
Draw wire-frame profiles

EXTRA!
Part 2 of our
PULL-OUT GUIDE
to software for
the BBC Micro

32K BBC ALL O.S.'s



PAINTER Written entirely in machine code this fast arcade style game features sixteen different screen presentations and six skill levels which make the game harder as you get better. **£8.00**



PLANES Another A&F machine code special. Select either 'fast' or 'slow' and stand by your keyboard for action. Hi-score tables and brilliant graphics **£8.00**

FROGGER Also written in machine code this is a frustrating exercise in crossing the road, fording a river and trying for extra points by picking up the lady frog. Beware of the snake and don't forget the crocodile! **£8.00**



TOWER OF ALOS An excellent adventure game which has the feature of saving your character if you die. Also for the Model A.

PHARAOH'S TOMB The interactive adventure game for the BEEB. Pick up the gold pieces, fight the spider and be scared penniless by the mummy. Work out the magic words and you are on your way. **£8.00**

LUNAR LANDER One of our old favourites and still just as difficult to get down in one piece. **£6.90**

ALL BBC PROGRAMS AVAILABLE ON DISC AT **£11.50** EACH.

AVAILABLE FROM ALL GOOD SOFTWARE HOUSES OR DIRECT FROM

A + F SOFTWARE

830 HYDE ROAD, MANCHESTER M18 7JD

061-223 6206 TELEX 667461 (Attn. A + F)

Announcing more exciting programs for the BBC.

Acornsoft is the software division of Acorn Computers, the company that designed and built the BBC Microcomputer. Here are four more exciting programs, all designed to get the most from your BBC Micro.

Starship Command (£9.95) is a demanding high-resolution graphics game in which you command a starship against attacking alien ships. You control the forward drive and rotational thrust of your ship, which is equipped with shields, long and short-range scanners and a sector display of the stars and alien ships.

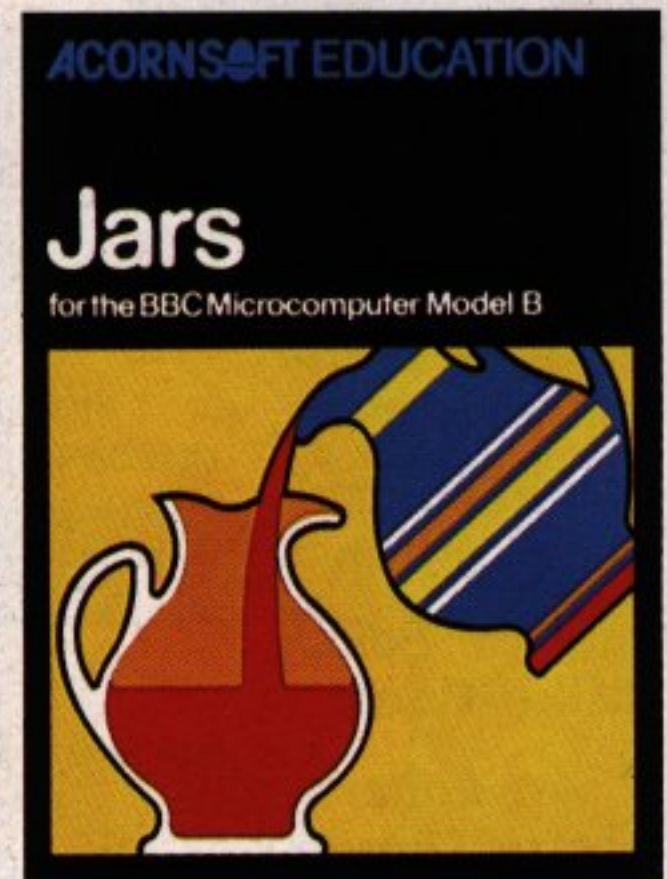
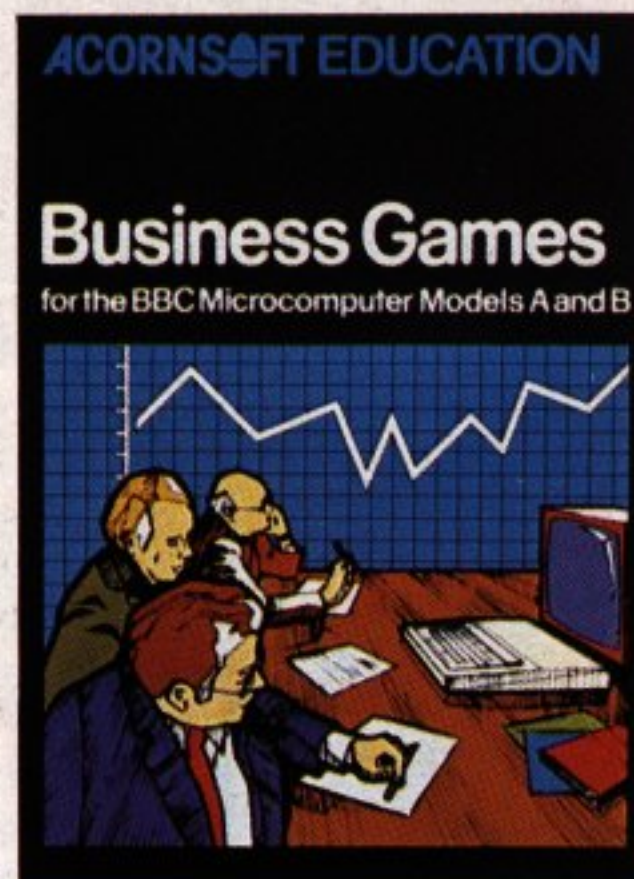
Countdown to Doom (£9.95) is a race against time as you strive to repair your damaged space ship in the corrosive atmosphere on the planet Doomawangara (Doom). Beat the clock or resign yourself to a life in the wilderness of Doom.

Business Games (£9.95) is a cassette containing two games designed for economics, business or general studies teaching.

In Stokmark, up to eight players compete in buying and selling shares aided by a screen display of relevant market information.

In Telemark, players compete to dominate in the manufacture and sale of televisions. The winner is the one who makes the largest profit or controls over half the total market.

Jars (£11.90) is an educational cassette suitable for 7-13 year olds. The objective of the program is to present, what are usually thought of as purely numerical problems, in a visual way. Jars of liquid are used to visualise volume estimation and fraction problems. Success, partial success or failure is noted by a scoring system and suitable comments.



How to get Acornsoft programs.

If you're a credit card holder and would like to buy cassettes of the programs shown in this advertisement, or if you would like to know the address of your nearest stockist, just phone 01-200 0200.

Alternatively, you can buy the cassettes directly by sending off the order form below to: Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL.

Also use this form if you would like to receive the current free Acornsoft catalogue.

Please allow 28 days for delivery.

☎ Credit Card Holders. Telephone 01-200 0200.

To: Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL.

Please send me the following:-

PROGRAM	PRICE	QUANTITY	TOTAL	(Code Acornsoft use only)
Starship Command	£9.95			SBG22
Countdown to Doom	£9.95			SBG19
Business Games	£9.95			SBE03
Jars	£11.90			SBE15
TOTAL				

I enclose PO/cheque payable to Acornsoft Ltd.
Or charge my credit card.

Card Number _____

(Amex/Diners/Visa/Access (Delete))

Please send me the Acornsoft brochure ☐

Name _____

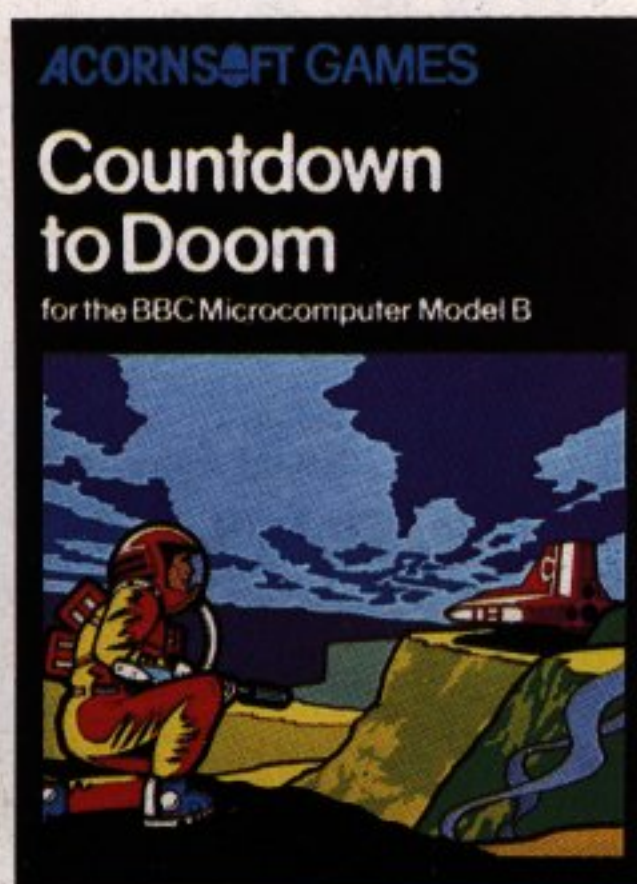
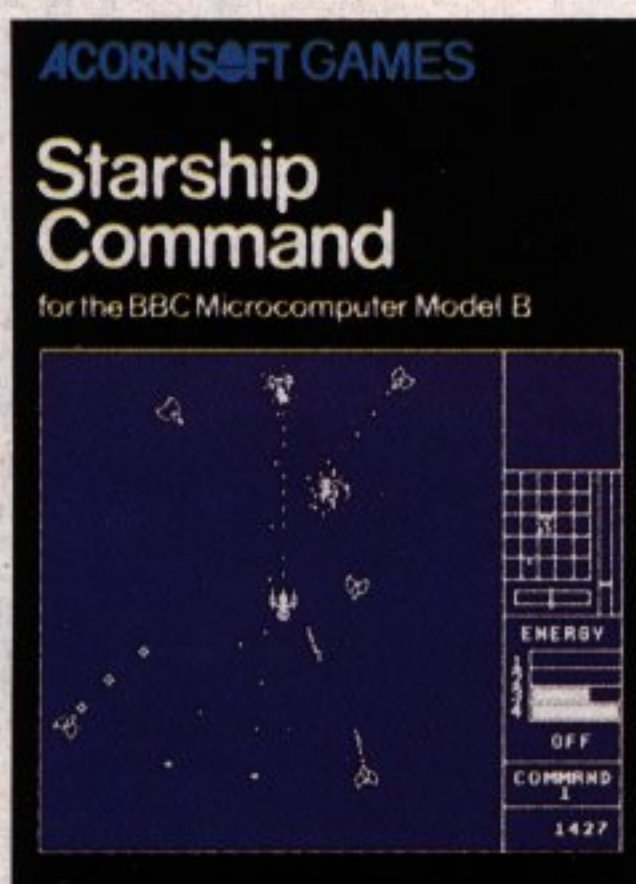
Address _____

Postcode _____

Signature _____

Registered No. 1524763. VAT No. 215 8123 85

ACORNSOFT





Vol.1 No.5 July

Managing Editor
Derek Meakin

Features Editor
Mike Bibby

Technical Editor
Mike Cook

Art Editor
Peter Glover

Advertisement Manager
John Riding

Advertising Sales
John Snowden
Mike Hayes

Marketing Manager
Linda Dobson

Tel: 061-456 8383 (Editorial)
061-456 8500 (Advertising)
Telex: 667664 SHARET G

Published by:
Database Publications Ltd,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

Subscription rates for
12 issues, post free:
£12 - UK
£13 - Eire (IR £16)
£18 - Europe
£15 - USA (surface)
£25 - USA (airmail)
£15 - Rest of world
(surface)
£30 - Rest of world
(airmail)

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

© 1983 Database Publications Ltd. No material may be reproduced in whole or in part without written permission. While every care is taken, the publishers cannot be held legally responsible for any errors in articles or listings.

The Micro User is an independent publication and neither the BBC nor Acorn Computers Ltd are responsible for any of the articles in this issue or for any of the opinions expressed.

Distribution to the news trade in the UK and Ireland is by Wells Gardner, Darton and Co Ltd., Faygate, Horsham, West Sussex RH12 4SU (tel: Faygate 444). Enquiries regarding overseas distribution should be made direct to the publishers.

CONTENTS

NEWS

Keep up to date with the latest happenings in the exciting world of the BBC Micro.

9

EPSON FX80

A frank assessment of Epsons' latest printer. What can it do? Is it worth the money?

17

COMPETITION

Solve our crossword, write a clue – and you may win yourself a printer worth £500.

18

DIGITISER REVIEW

What's a digitiser? Do you need one? And is this the one you need? The answers are here.

22

STRUCTURE

This month we see how procedures can help to add sense and elegance to our programs.

25

CASSETTE BUGS

More practical advice from experts on loading problems – and how you can avoid them.

31

WORDWISE

We bring you the very last word on the word processing program that comes on a chip.

38

DESIGN

Learn about an easy way to use your micro as a computer-aided design tool, with full listing.

44

PRINT

Our guide to editing tells you how to get what you want where you want on the screen.

48

GRAPHICS

We take another look into graphics windows at changes of co-ordinates.

52

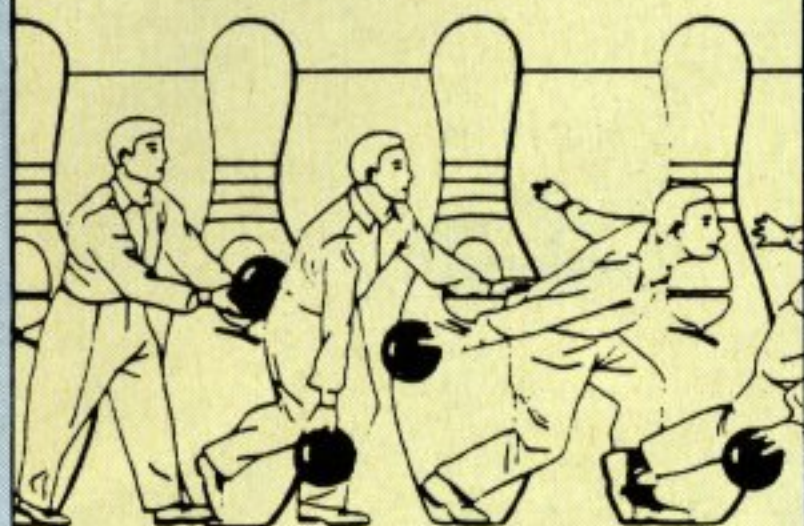
DIRECTORY

Second part of our pull-out guide to more than 400 BBC Micro software programs.

55

42

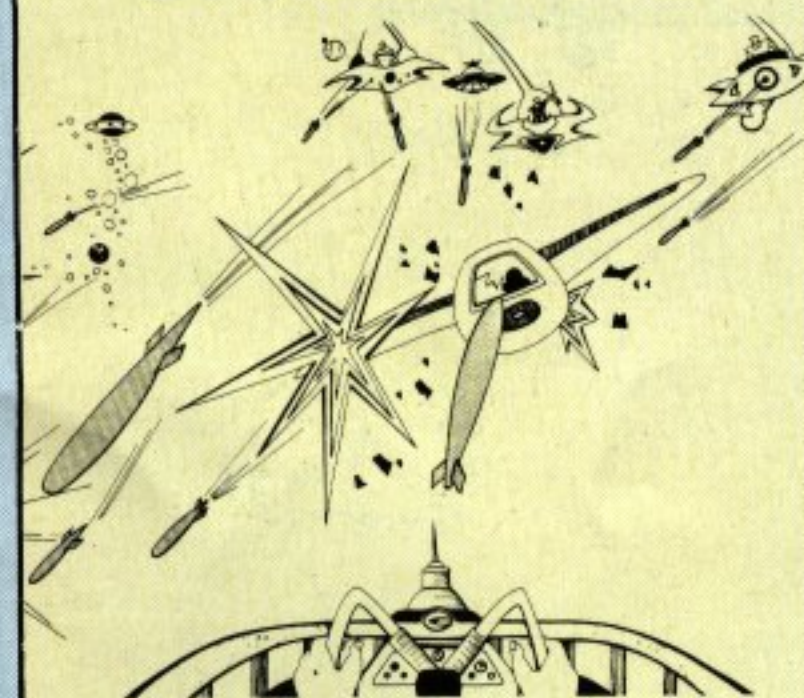
STRIKE LUCKY WITH TENPINS



There's no need to go to the bowling alley – just key in this fast-moving game of skill

54

GAME of the MONTH SPACE PODS



Your chance to save the universe from the onslaught of the burrowing aliens.

60

BITS & BYTES

If you would like to nibble a bit but don't know how, then this is the article for you.

63

TAPE OFFER

Save yourself the chore of keying in programs from this issue with this month's cassette.

64

BOOKSHOP

We've chosen 16 of the best books for the BBC Micro for this month's offer to readers.

67

WORKSHOP

Backdoors, keys and works of art – this is a must for the more experienced user.

72

SUBSCRIBE NOW

A year's subscription to The Micro User will bring you a FREE copy-holder and crib sheet.

76

SOFTWARE

Our frank reviewers strike again with their honest assessments of commercial programs.

80

TUTORIAL

Have fun looping the loop with Part V of our simplified introduction to programming.

82

UPGRADE

The Beeb Bodybuilding Course explores ways of making the most of the user port.

91

BACK ISSUES

Find out about the features you missed in the last four issues of The Micro User.

93

FORMAT

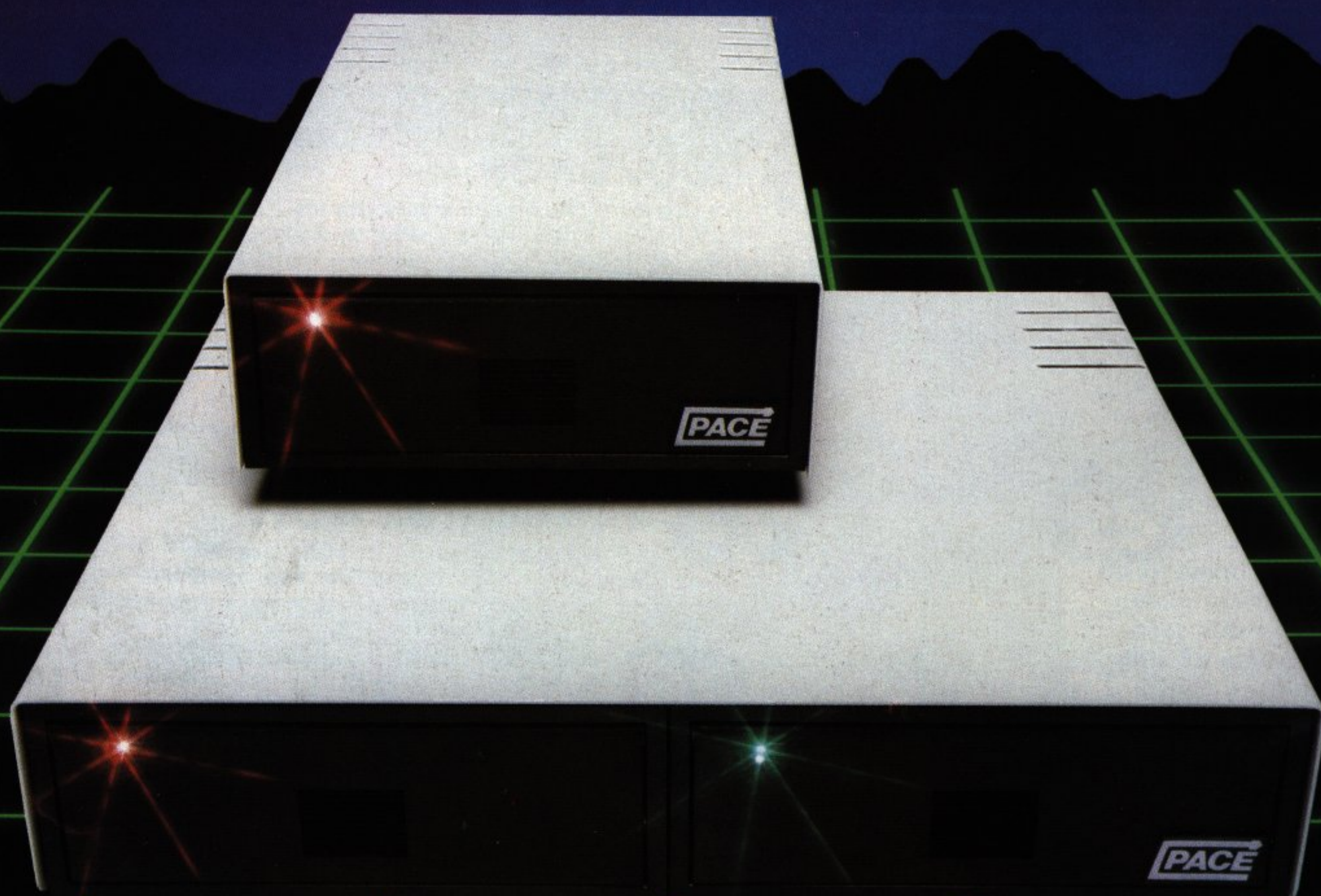
Here's a program that shows you a clever way to tidy up your listings.

105

MICROMAIL

The section you write yourself – just a small selection from letters pouring in every month.

BYTE YEARS AHEAD!



Now available for the BBC Microcomputer, this superb range of high performance, low profile disc drives which give more data storage, and use less space.

The Pace range of drives include two drives which are switchable between 40 and 80 tracks. As these drives are double sided they give a massive 400 k *per drive* in 80 track mode, whilst in 40 track mode they retain compatibility with Acornsoft

and other commercially available software. These dual track drives feature multi-colour LED's to indicate mode selection.

All Pace drives are capable of being used as double density drive so that, as and when, a new filing system and interface become available, the disc storage capacity will be doubled (eg. the dual 40/80 drive will have an unbelievable 1.6m of storage).

Pace disc drives are designed to run off the BBC power supply and are supplied complete with all cables, a utilities disc and manual.



**130 Clayton Road,
Bradford, BD7 2LY,
Tel: (0274) 575973**
Dealer enquiries welcome

Disc drives available:-

			ex. V.A.T.	inc. V.A.T.
PSD1	Single Sided Drive (40 track)	100k	£185	£212.75
PSD2	Double Sided Drive (40 track)	200k	£235	£270.25
PSD3	40/80 Switchable Drive 400k		£345	£396.75
PDD1	Dual Single Sided Drives (40 track)	200k	£338	£388.70
PDD2	Dual Double Sided Drives (40 track)	400k	£449	£516.35
PDD3	Dual 40/80 Switchable Drives	800k	£610	£701.50

*Carnage and insurance charge of £4.50 inc. V.A.T. to be added per drive

Also available from:- Computer City, Widnes, Cheshire. Tel: 051-420-3333. Computerama, Stafford. Tel: 0785-41899.
Computerama, Stoke on Trent. Tel: 0782-268620. G.T.M., Leeds. Tel: 0532-647474. Catel Computer Centre, Wigan. Tel: 0942-44382.

OFFICIAL BBC ACORN DEALER

DISC DRIVES FOR YOUR BBC MICRO

£599
800K



Also compatible with many other Micro-Computers

£335
400K



- All Disc Units include 40/80 Track Formatting Disc, Power Supply, Disc Drive Cable and Manual
- All units carry a 1 year warranty

£199
100K



Information only available from

LONDON & THE SOUTH

COMPUTER PERIPHERAL SUPPLIES
2/10 Whitchurch Road
Pangbourne Berkshire
Tel: 07357 2721 or 4417

MIDLANDS & THE NORTH

TECHNICARE PRODUCTS LTD
22 Sansom Walk
Worcester
Worcestershire Tel: 0905 29290

Dealer & Government enquiries welcome

Please send me further details

Name _____

Company _____

Address _____

Tel No _____

SPECIAL OFFER!
Deduct £1 per cassette or disc when ordering 2 or more.

THE BEST BBC MICRO SOFTWARE

PRODUCED BY AN INDEPENDENT SOFTWARE HOUSE

— TOP QUALITY MACHINE-CODE PROGRAMS —

BBC



CENTIPEDE (32K) £7.95 Cassette

Incredible arcade type game featuring mushrooms, snails, flies, spiders and the centipedes of course. Excellent graphics and sound. 6 skill levels, hi-score, rankings, bonuses, and increasing difficulty as the spiders become more active and the number of mushrooms increases.

"Visually this game compares well with the arcade version, being colourful and clear."

... YOUR COMPUTER



SPACE FIGHTER (32K) £7.95 Cassette

Arcade-style game based upon features from DEFENDER and SCRAMBLE. 5 types of menacing alien fire at you and may attempt to ram you. Separate attack phases, fuel dumps, repeating laser cannon, asteroids, smart bombs, hi-score, rankings, 6 skill levels, sound effects.

"A thoroughly enjoyable program, well worth the money..."

... HOME COMPUTING WEEKLY.



FROGGER (32K) £7.95 Cassette

Not just another version of Frogger... this is the proper high-quality version that you've been waiting for. Graphically brilliant, with gaping-mouthed crocodiles, diving turtles, and frogs that flex their legs as they jump along. Increasing difficulty, hi-score, responsive controls, sound effects, flies and bonus frogs.

●●● NEW RELEASE ●●●



GALAXIANS (32K) £7.95 Cassette

Fast action version of the popular arcade game. 4 types of Galaxian (in 3 initial screen formations) swoop down individually or in groups of two or three. 6 skill levels, high score, rankings, bonus laser bases and increasing difficulty. Superb sound effects and graphics.

"Both... are well-produced, with colourful graphics, responsive controls and the usual bunch of extra-terrestrials." ... YOUR COMPUTER



ROAD RUNNER (32K) £7.95 Cassette

The only full feature machine-code version of the arcade game available for the B.B.C. micro. Features include: scrolling screen, radar display, checkpoint flags, fuel gauge, smoke screens, 6 skill levels, rankings, increasing difficulty, and sound effects.

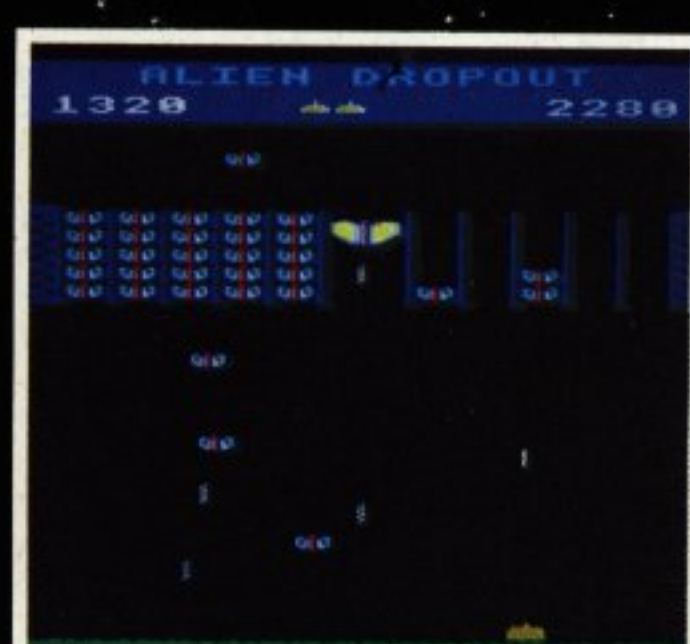
Suitable for use with keyboard or joysticks.

●●● NEW RELEASE ●●●



INVADERS (32K) £7.95 Cassette

Superb version of the old classic arcade game, including a few extras. 48 marching invaders drop bombs that erode your defences, and two types of spaceship fly over releasing large bombs that penetrate through your defences. Increasing difficulty, high score, superb graphics and sound.



ALIEN DROPOUT (32K) £7.95 Cassette

Based upon the arcade game of ZYGON, but our version improves upon the original arcade game itself. You have to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full, the aliens fly down relentlessly, exploding as they hit the ground. Suitable for use with keyboard or joysticks.

"Do not be fooled by their placid appearance - these moths are out to get more than the clothes in your wardrobe." ... YOUR COMPUTER



FRUIT MACHINE (32K) £7.95 Cassette

Probably the best fruit machine implementation on the market. This program has it all... HOLD, NUDGE, GAMBLE, spinning reels, realistic fruits and sound effects, multiple winning lines. This is THE fruit machine program to buy.

"The graphics are very good and with a little imagination you might be able to convince yourself you are in Las Vegas." ... YOUR COMPUTER

DEALERS . . . DEALERS . . . DEALERS . . . DEALERS . . . DEALERS . . .

All our programs are available at all good dealers including:-

ELTEC COMPUTERS, 217, Manningham Lane, Bradford.

BUCON LIMITED, 18 Mansel Street, Swansea.

WEST COAST PERSONAL COMPUTERS, 47 Kyle Street, Ayr.

BYTEWARE LIMITED, Unit 25, Handyside Arcade, Newcastle.

MICROSTYLE, 29 Belvedere, Lansdown Road, Bath.

MICROSTYLE, 47 Cheap Street, Newbury, Berks.

SIR COMPUTERS LTD., 91 Whitechurch Road, Cardiff.

ELECTRONEQUIP, 36-38 West Steet, Fareham, Hants.

MICRO MANAGEMENT, 32 Princes Street, Ipswich.

3D COMPUTERS, 230 Tolworth Rise South, Tolworth, Surbiton, Surrey.

+ MORE THAN 30 OTHER DEALERS IN THE U.K. AND OVERSEAS.

WE PAY 25% ROYALTIES FOR HIGH QUALITY PROGRAMS



SUPERIOR SOFTWARE

Dept. BMU3,

69 Leeds Road, Bramhope, Leeds.

Tel. 0532-842714

8 MICRO USER July 1983

DISC SOFTWARE AVAILABLE NOW

All our programs are ready for despatch on 5¼" discs at £11.95 each.

WE GUARANTEE THAT:

- (1) All our software runs correctly on all current operating systems and BASIC ROMs.
- (2) All our software is available before we advertise.
- (3) All our software is despatched within 48 hours by first class post.
- (4) In the unlikely event that any of our software fails to load, return your cassette or disc to us and we will immediately send a replacement.

PROCESSOR No 2 'SOON'

ACORN now says the second processor option will be available some time next month – it was originally due to be released in April.

A spokesman said the release date was dependent on the availability of applications software which is being written as a "bundle" concept.

Two extra processors will be available and will plug into the underside of the machine. Each will give the micro a total capability of 64k RAM.

The second 6502 processor will cost around £200 and the Z80, giving CP/M capability, around £300.

Obvious

Was the BBC Micro developing a potential as a business machine? The spokesman said: "It is the obvious route, but whether Acorn will follow that or go for another machine I don't know."

"What we are really saying at this stage is that more and more power is being given to the home user."

16k DFS is here

THOSE enterprising backroom boys at Watford Electronics have done it again.

Their latest product is the first independently produced Disc Filing System for the BBC Micro.

Their DFS is on a 16k EPROM, compared to the 8k DFS supplied by Acorn.

And it has a number of other special features. It allows you to read 40 track discs on an 80 track drive.

It can also be formatted to store 61 files compared to the normal 32.

Latest news is that another company, Pace Software Supplies, are also about to bring out a DFS chip.

One advantage over the Watford chip is that it can be used to perform several tricks to help protect the software.

NEWS

Micro boosts AB's profits by million

PROFITS are soaring for a Welsh hi-tech company, AB Electronic Products – thanks to the BBC Micro.

AB, one of the companies making the machine under contract to Acorn, recently announced its best ever half year profits. In the six months to the end of December they rose 166 per cent to a record £806,000.

Now stockbrokers are forecasting that group profits for the year should jump £1.3 million to a massive £2.5 million. And in the next financial year they should be boosted to over the £4 million mark.

AB make no secret of the fact that this success is due to the tremendous

BUT METTOY'S SHARES SLUMP

demand for the BBC Micro.

They supply about 60 per cent of Acorn's needs and machines are now leaving the Welsh factory at the rate of more than 2,000 a week. These alone are putting about £15 million a year on to AB's turnover.

Now the group is hoping for an even greater involvement with Acorn. It has put in a tender to start churning out the forthcoming

Electron – and in even greater quantities.

All of which is good news for AB shareholders – especially those who bought when shares could be had for 92p. By

last October they had jumped to 428p, when there was a one-for-four rights issue.

In the last six months the shares have risen by 112 per cent.

But there's not such good news for another Welsh computer manufacturer, Mettoy, who make the Dragon. They suffered a loss in the last 12 months of £3.8 million, and their shares took a steep dive when the news was announced.



CARRYING his enthusiasm for the BBC Micro to the limit, Hampshire schoolteacher Mike Walton turned the recent London marathon into a personal micro marathon.

He responded to a challenge from Tim McBrown, managing director of Haslemere Computers, who promised to donate a BBC Micro to Mike's school if he completed

the 26 mile event.

Mike (pictured in the centre receiving his system from Mr McBrown) clocked in at 4 hours 8 minutes.

Bohunt School already has 17 micros, including six BBC machines, and many of its 1,050 pupils sponsored Mike's run to raise money for more equipment.

Computer studies are included in the curriculum for all pupils.

Mainframe link breakthrough

COMPUTER buffs at some of Britain's major universities have succeeded in converting the BBC Micro into a terminal emulator, enabling it to talk directly to giant mainframes.

Working completely independently, a number of universities have revealed they have been able to produce a sideways EPROM that fits onto the BBC Micro board and allows it to in-

teract with its much bigger counterparts – but at a fraction of the cost of a conventional terminal.

These normally sell for around £2,500. But the cost of an adapted BBC Micro, including the EPROM, is no more than £450.

The breakthrough opens up the possibility of cheap, low-res graphics terminals tapping the massive power of mainframes.



MIKE COOK JOINS MICRO USER

AN electronics wizard who built his first computer on a plank of wood seven years ago has joined *Micro User* as technical editor.

He's Mike Cook, who has been a contributor since our first issue and whose monthly Beeb Bodybuilding Course is producing many appreciative comments from readers.

Mike, now 31, left his secondary modern school at 16 to go into industrial electronics, then went to Newcastle upon Tyne to study towards his degree in physical electronics.

From there he went to work at the Admiralty's Underwater Weapons Establishment at Portland, to Salford University to do research into digital communications, and then became a lecturer at Manchester Polytechnic.

One of his current tasks is conducting a two-year course for teachers – using the BBC Micro, of course.

At the end of the course they get the Poly's diploma in micro-computing in secondary education.

Mike made his first micro in 1976. It had 256 bytes of memory, no software and no keyboard. He programmed it by flicking switches.

When the BBC Micro was launched Mike was one of the first people to get hold of one – and was immediately hooked.

"I think it's one of the most exciting computers that has ever been produced", he said. "There's so much going for it."

'Dead' Bug-Byte bites back

A SUGGESTION by Chesterfield software house Kansas that their rivals Bug-Byte are no longer in existence has brought a strong protest from the Merseyside company.

Bug-Byte's premature "death" is reported in the latest Kansas newsletter, in an article about the many problems the BBC Micro's new Basic interpreter is creating for software suppliers.

Says Kansas: "No less than 27 different modifications have caused havoc with many programs, with virtually all the software suppliers being affected, with perhaps the now defunct Bug-Byte suffering worst."

The remark made Bug-Byte's Tommy Baden almost as crimson as one of the crosseyed monsters forming the company's trademark.

"It's a load of rubbish" he said. "In fact the opposite's the case. We are expanding in all directions – moving into new offices, taking on more staff. We've never been more alive!"

Back in Chesterfield Kansas executive Tom Crossley was most apologetic. "I thought the

lads had split up", he said. "I'm sure I read it in one of the trade magazines."

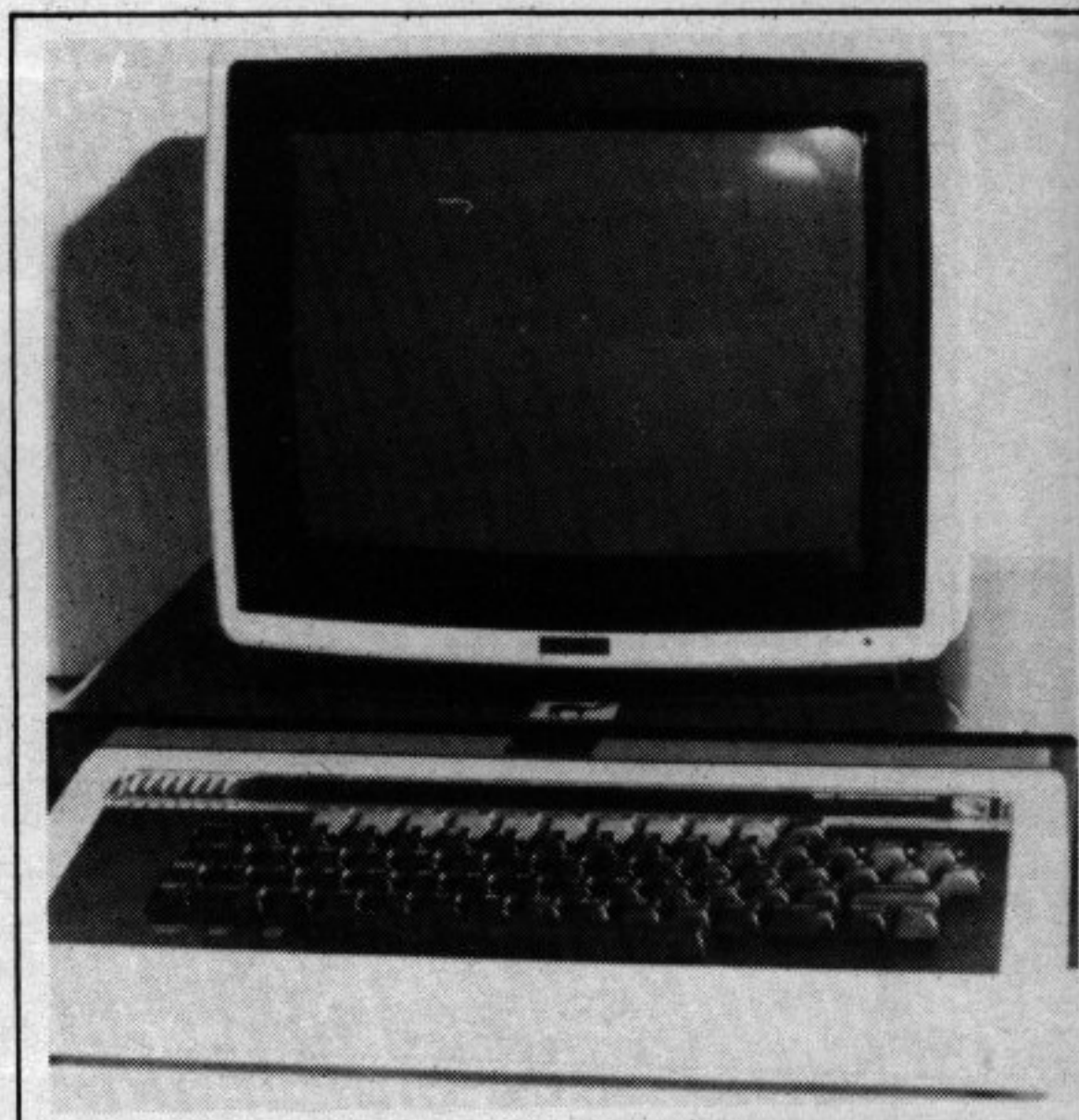
The offending article had really been intended to get at Acorn, not Bug-Byte.

It claimed that the BBC Micro had been put on the market way before it was ready – a view which they said was borne out by the "seemingly endless" modifications to the operating system, as well as the revised Basic.

Unnecessary

"It is the simple – and many people believe unnecessary – things in the new Basic that are causing all the trouble", says the newsletter. "Many believe these are a ploy on Acorn's part to actually give other suppliers problems."

"What is really hurting Acorn is the vastly superior service offered by other software suppliers of just a few days as against a few weeks."



A MONITOR can now be placed above the BBC Micro instead of behind or beside it, with the release of a perspex stand from Camel Products.

The stand, which measures 17 x 12 x 3.75in and costs £19.95, sits over the micro but still allows access to the machine from front or rear.

CHIP ROM

A SERIAL processor chip to run the long awaited cartridge ROMs for the BBC Micro is due for release at any time, according to a spokesman for Acorn.

However the cartridge ROMs themselves are not yet available and it seems that the serial processor can only be ac-

Orders pour in for teletext adapter

THREE thousand orders have been received for Acorn's teletext adapter, which is designed to enable the BBC Micro to download pages transmitted over the air by Ceefax and Oracle.

But latest news is that the adapter is still under development, and the first will not be going out to customers until August at the earliest.

Two hundred are at present undergoing field trials. Full scale production of the adapters will not be started until these trials are complete.

The volume of the orders – worth £675,000 – show the tremendous public interest there is in the adapters, even though

they have not yet been advertised.

A BBC spokesman told *Micro User*: "We don't want to be saddled with a long waiting list as has been the case with the BBC Micro itself, so we are keeping rather quiet about the adapter."

"The backlog of orders will have to be dealt with first, so anyone ordering one now will have to wait until late September or early October."

The £225 adapter consists of a sideways ROM which fits inside the BBC Micro. Signals are

received off-air via a normal aerial feed that plugs into the machine's 1MHz bus.

With the adapter an ordinary TV set or monitor can receive all teletext transmissions. It has a number of extra features, such as downloading a page while reading another page, or stepping through a sequence of pages.

Users will be able to download free software programs which the BBC transmit as Ceefax pages. Once in memory they can be used as ordinary programs and can be edited or used within other programs. Pages can also be stored on disc or cassette.

Micro to

A SYSTEM which uses the BBC Micro to control a videodisc player is due for release in the UK at the end of the month.

Aimed at the educational market, the videodisc is used to display the text and pictures of a presentation under the control of a BBC Micro, which is

The 'new standard' drive

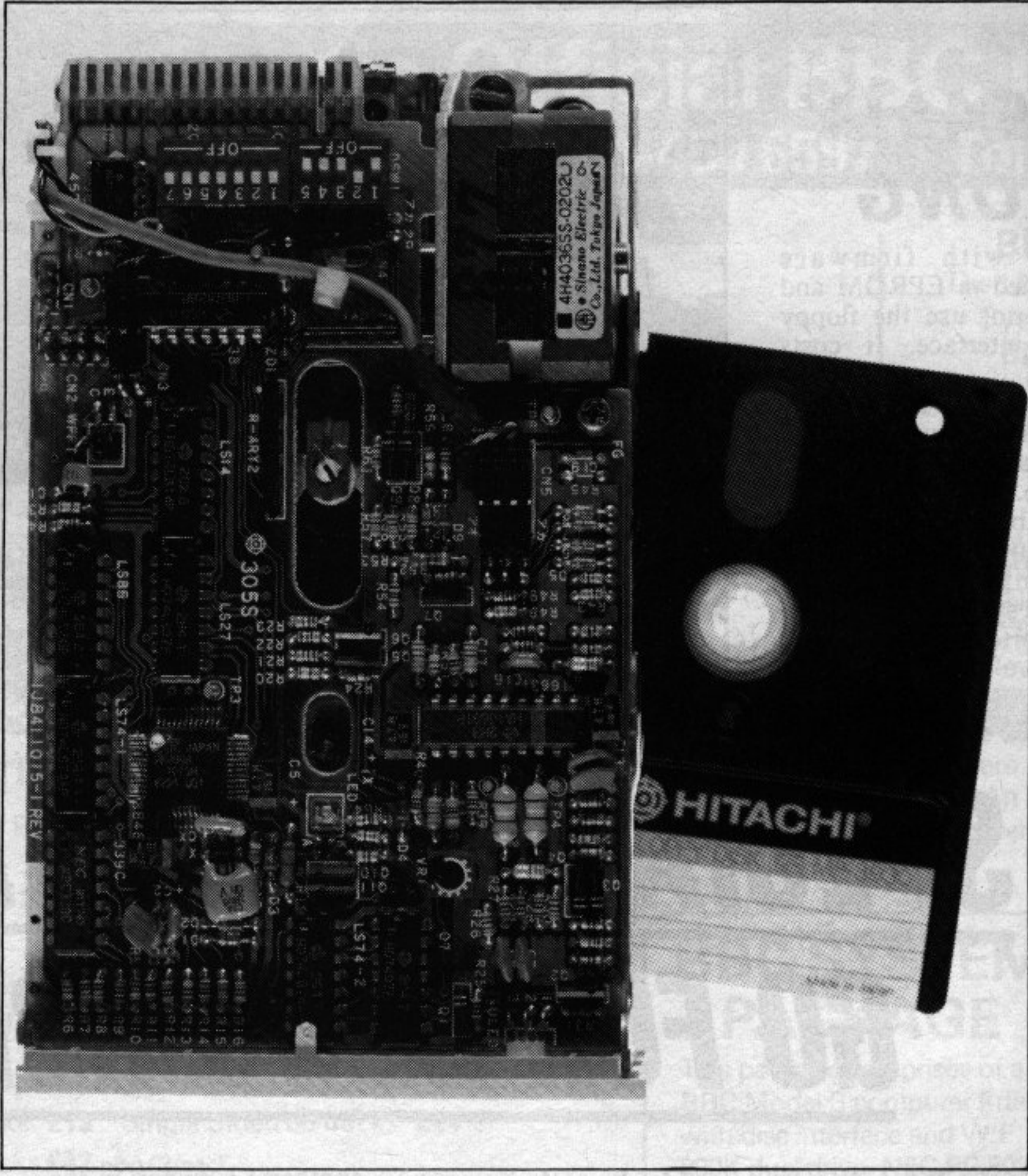
A 3in floppy disc drive launched at the BBC Micro User Show is claimed by distributors Advanced Memory Systems to be a new standard for home computer storage systems.

It is an Hitachi drive that can accept either double or single density rigid-cased floppies and which can be integrated with standard 5.25in floppy drives.

It uses a standard disc interface and looks like an ordinary 5.25in drive to the micro so that programs can be easily copied between a 5.25in and 3in drives.

The single drive retails for £225 and the double version for £399.

Blank discs cost £4.95 each and offer BBC Micro users 100k storage each side.



The MUGs are coming!

IN response to numerous requests from readers in all parts of Britain, plans are now well under way to set up a nationwide chain of Micro User Groups – exclusively for users of the BBC Micro.

It is hoped that MUGs will be formed in every town and city in Britain.

Membership will bring many benefits. They will be able to:

- Meet other local users of the BBC Micro.
- Share ideas and swap programs.
- Arrange visits with neighbouring MUGs.
- Enjoy worthwhile discounts on hardware and software.

As a first step in forming a network of MUGs, Micro User is compiling a register of people who would like to join their local group.

We also want to hear from people who would be interested in taking a more active role in the formation of the group.

All we ask you to do at this stage is to complete the form below and return it to us as soon as possible.

If you do not want to cut your copy of Micro User you can send the details on a separate sheet of paper.

But please write soon because we want to take immediate steps to get you all together and start meeting on a regular basis.

Those of you who have already been to meetings of computer clubs know how enjoyable they can be – and how much you can learn from fellow enthusiasts.

We want local MUGs to play a leading role in helping you get lots more fun out of your BBC Micro.

So don't delay. Fill in the form below and let's get the ball rolling!

FOR CARTRIDGE DUE FOR RELEASE

quired through buying Acorn's new speech synthesiser at the same time.

For £55 the synthesiser will incorporate two extra sockets to the left of the keyboard – the infamous "ashtray" of the earlier models.

The cartridge ROMs will plug into the ashtray – the concept is similar to

that used by cartridge based computer games systems, but it has a much more versatile and powerful result.

Combined

The two things are combined because the ROMs will use one of the two chips – the serial processor – employed by

the speech synthesiser package to send data to the computer.

A BBC Micro dealer told *Micro User*: "If Acorn marketing men had been cleverer they would have announced the serial processor chip – which everyone has been waiting for – and then declared, as an added bonus, that they'd thrown in a speech synthesiser capability – which not everyone had been waiting for – for the same price."

Instead, an Acorn spokesman says he doesn't know whether the cartridge serial processor chip will be made available separately, and so it seems that a user will have to buy the synthesiser to be able to use the cartridges.

Observers say Acorn was worried that a third party developer would

beat it to the post with the project.

The 1.2 operating system will be needed to use the cartridge socket. Acorn says that users with the old 0.1 OS will be given a free upgrade when they have the speech synthesis/cartridge ROM system installed by a dealer.

control videodisc

programmed to allow the user to influence the presentation as it unfolds.

With rival systems costing more than £5,000 this package, which retails at under £2,000, should be attractive to the education and industrial training sectors at which it is aimed.

It is the product of

more than two years research by Michael Grove, who is a BBC Micro enthusiast.

The software is both EPROM and disc-based and, as well as Basic, it supports the authoring language Microtext Plus, which it is claimed allows the system to be used by a complete novice.

SEND TODAY!

- ☐ I would like to become a member of my local Micro User Group.
- ☐ I would like to help in setting up a local Micro User Group.

Name

Address

.....

Phone No

POST TO: MUG, Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

HOBBIT REALLY HOPS ALONG

A DIGITAL cassette recorder, claimed to be seven times faster than a standard cassette recorder and a cheaper alternative to a floppy disc drive, has been released by Ikon Computer Products.

The Hobbit is compatible with all versions of the operating system, including 0.1. It connects to the BBC Micro's I/O

port with firmware supplied in EPROM and does not use the floppy disc interface. It costs £135.

It measures 4 x 4 x 4in and up to two units can be daisy-chained to the micro. In use five files can be opened simultaneously for reading or writing, and random access files are supported.



Survey selects Beeb

THE Daily Express has carried out a detailed survey of 14 home computers. And the one that came top of their league table was the BBC Micro.

They compared the computers in six different categories — games, education, business, learning to programme, software availability and value for money — and said whether they were “good”, “average” or “only fair”.

The BBC Micro was the only machine to get a “good” rating in each category.

Said the Express: “The BBC — particularly its B version,

SPECIAL schools could be the next beneficiaries to take a slice of the £40 million being spent by the government in its micros in schools project.

And this may mean another big boost for the BBC Micro, which is especially suited to schools for the handicapped because of its enhanced sound and colour capabilities.

It is understood that the Department of Education and Science is considering several plans, including one which would be substantially better than the present £

for £ subsidy on approved micro systems, to take into account the needs of special and handicapped pupils.

A government spokesman confirmed that the Department had been considering several related options.

Extended

Meanwhile the government's micros in secondary schools has been extended for a further year — with

another £3 million in the kitty.

The extension allows the 6,500 secondary schools which took advantage of the original offer, which ended last December, to upgrade their systems and still receive the 50 per cent subsidy.

For schools which opted for the BBC Micro the new package includes provision to upgrade from the model A to the model B machine and to acquire disc drive and Econet interfaces, a colour monitor (from Microvitec), a dot matrix printer (from Walters

Microsystems) and a special selection of software from either Acorn or Tecmedia.

Extras

The upgrade package costs about £700, of which the Department of Industry will pay half.

Optional extras, also subsidised, include an Economatics micro controlled robot device which can move in any direction, detect collision, operate a pen and even read music from a bar code and play it back, and scientific measuring equipment from Education Electronics.

BARRY WOOD'S TAILPIECE

DESPITE all the claptrap about the 8271 not being obsolete, Acorn still can't get hold of it. At least, if they're doing so, the chips aren't reaching the public.

Of course, this might be because the machines aimed at the American market will all be fitted with disc interfaces.

However, 8271s are readily available if you are willing to search them out for yourself.

Even if you do get

one, your problems aren't over, since Acorn won't sell you the DFS you need to run it. Talk about a “my bat and my ball” attitude.

I WAS in my local hostelry the other night when I met another Beeb-owning regular.

“You know something about computers. I've just paid £11 over the odds to get my BBC Micro upgraded to 1.2 OS. While I was there a

guy in the shop paid exactly what I'd paid for my machine originally and he got not only OS 1.2 but also Basic II,” he said.

“I had to pay £11 more and didn't even get Basic II. Can you give me a good reason?”

It's not often I'm lost for words, but that stumped me. So here's the Barry Wood competition: Can you think of a reason that would satisfy my friend?

The prize will be a

0.1 Operating System..

ACTUALLY, I suppose I have been a little naughty to Acorn since they do produce a marvellous product. So I've decided to produce a letter of apology.

I've got a prototype apology drafted and it seems to be going well. At this point, though, I don't want to release it as it has one or two bugs, but I guarantee it will be out in time for Christmas, I think, and

I am taking orders if anyone wants a copy.

When it finally comes out, its only rival will be Acorn's apology for customer relations.

THE BBC's next series on the micro will be concentrating on using the computer to control the outside world.

Rumour has it that the BBC would dearly like to interface a micro to a few people at Acorn.

Technomatic Official BBC Dealer

01-452 1500

01-450 9764

01-450 6597

Telex: 922800

BBC

Model B £399

(price includes VAT. Carr. extra £8)

Complete Upgrade Kit **£50**

Installation **£15**

Individual Components and Connectors available.

'VIEW' BBC Word

Processor ROM **£52**

Wordwise ROM **£34.50** Teletext Adaptor **£196**

Wide Range of Business, Education and Fun Software from **ACORNSOFT, PROGRAM POWER AND GEMINI** in stock.

BBC COMPATIBLE 5¼" DISC DRIVES

These drives are self powered and supplied in BBC matching colour cases.

SINGLE DRIVES: 100K **£180** 200K **£250** 400K **£330**

DUAL DRIVE: 200K **£350** 400K **£475** 800K **£590**

Carr. £6/Single drive £8/Dual drive. Disc Cable: Single £8 Dual £12

Disk operating manual & formatting diskette **£17.50**

DISKETTES in packs of 10 (p&p £2/pack)

Single Sided 40 tracks **£15** Single Sided 80 tracks **£24**

Double Sided 80 tracks **£32** p&p £2/pack

Lockable Box 30/40 discs **£21** 60/70 discs **£32**

Library Case **£2** Drive Head Cleaning Kit **£15**

SEND or PHONE FOR OUR
BBC LEAFLET

PRINTERS

NEC PC8023 BEC

• 80 Cols. 100 CPS • F&T Feed
£345 + £8 Carr.

EPSON RX80 & FX80

• RX80 100 CPS 80 Col. Tractor Feed
• FX80 160 CPS 80 Col. F&T Feed. Full specifications on request.
RX80 **£298** FX80 **£389** MX100 F/T3 **£425** Carr./Printer **£8**

SEIKOSHA GP100A £180 + £6 Carr.

GP250A £250 + £8 Carr.

Parallel Printer Lead **£13.50**; Serial Printer Lead **£13.50**

2000 sheets 9½" x 11" Fanfold Paper **£13.50 + £3 p&p**

Epson/NEC Serial Interface **£60**.

MONITORS

Microvitec 1431 14" RGB
£249 + £8 Carr.

Microvitec 2031 20" RGB
£319 + £10 Carr.

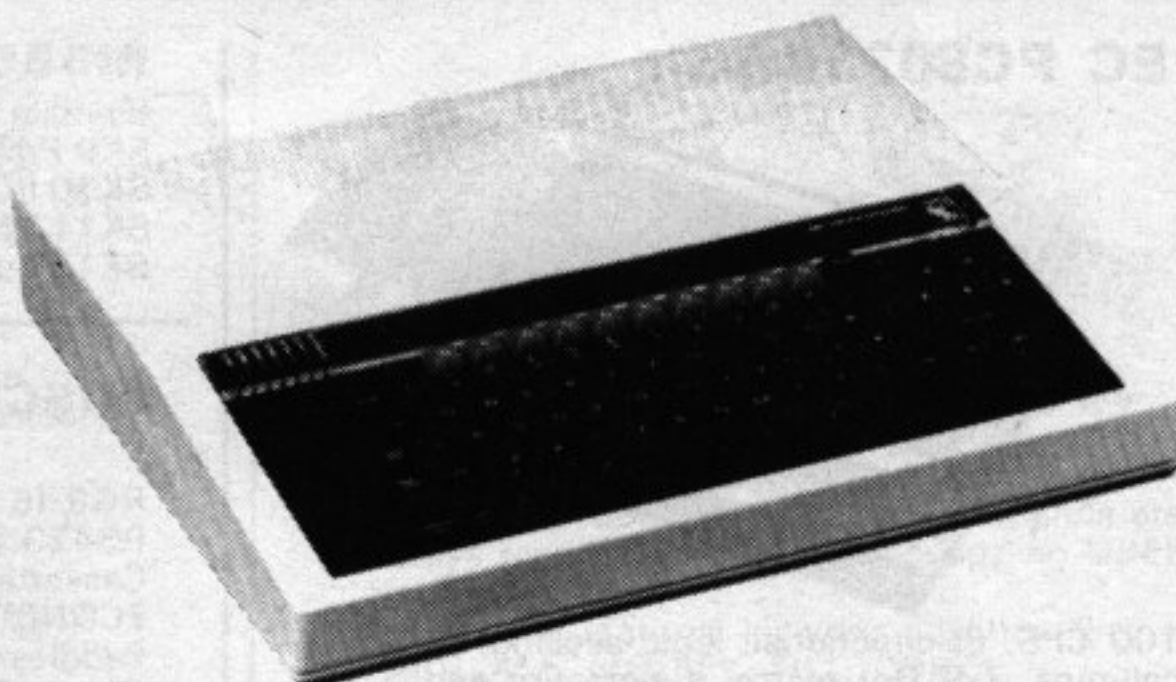
12" Hi Res Green Monitor
£99 + £6 Carr.

Also available Sanyo &
Kaga RGB Monitors

Please send SAE for our detailed price list of electronic and computer components

We carry a wide range of connectors and assemblies, Microprocessors, RAMs, EPROMs, Crystals, etc.

Price Lists, Leaflets available on request. Large stocks enable same day despatch on most orders. Please check for delivery details.



BBC DISC SYSTEM

Disc Interface inc. 1.2 operating
System **£95** Installation **£20**

BBC Single Drive (100K)

£230 + £6 Carr.

BBC Dual Drive (800K)

£699 + £6 Carr.

BOOKS (No VAT — £1 p&p/Book)

Basic Programming on BBC **£5.95**

30 HR Basic (NEC) **£5.95**

Let your BBC teach you to Program **£6.95**

BBC Micro Revealed **£7.95**

Assy. Lang. Program on BBC **£8.95**

Program the 6502 **£10.75** 6502 Games **£10.75**

6502 Software Design **£10.50**

BBC Micro An Expert Guide **£6.95**

BBC Computers Play **£6.95**

BBC SYSTEM PACKAGE

SPECIAL OFFER

This package comprises of a BBC Model B computer fitted with disc interface and W.P. ROM 800K dual drive, NEC PC 8023 Printer and 12" Green Screen Monitor. The system is supplied complete with all manuals, connecting leads and software for stock control, invoice and statements and mailing lists.

Package Price **£1,500** a saving of **£139**.

The SMARTMOUTH — a speech synthesiser ready to plug into the user-port, having an unlimited vocabulary, yet simple to use. Very economical in memory usage — typical words using 5-10 bytes. (Has Aux. audio output socket).

SMARTMOUTH is supplied complete with demo and development programs on cassette, and full software instructions. **£37 + £2 p&p**.

BBC Compatible Cassette Recorder

£26 + £1.50 p&p

SANYO Data Recorder

DR 101 A superior quality data recorder with dedicated computer output and monitoring facility on both RECORD & PLAY. **£39.50 + £1.50 p&p**

SLIMLINE Cassette Recorder

complete with counter and remote control **£22.50 + £1.50 p&p**

Cassette Lead **£3.50**

Computer Grade Cassettes **50p** each or 10 for **£4.50**

TECHNOMATIC LTD

MAIL ORDERS TO: 17 BURNLEY ROAD, LONDON NW10 1ED

SHOPS AT: 17 BURNLEY ROAD, LONDON NW10

(Tel: 01-452 1500, 01-450 6597. Telex: 922800)

305 EDGWARE ROAD, LONDON W2

PLEASE ADD 50p p&p & 15% VAT

(Export: no VAT, p&p at Cost)

Orders from Government Depts. & Colleges etc. welcome.



Detailed Price List on request.

Stock items are normally by return of post.



WATFORD ELECTRONICS

DEPT BBC, CARDIFF ROAD, WATFORD, Herts, England
Tel Watford (0923) 40588. Telex: 8956095

MAIL ORDER AND RETAIL SHOP. TRADE AND EXPORT INQUIRIES WELCOME.
GOVERNMENT AND EDUCATIONAL ESTABLISHMENTS OFFICIAL ORDERS ACCEPTED.
CARRIAGE: Unless stated otherwise, please add 50p to all cash orders. VAT: UK customers
please add 15% VAT to the total cost incl. Car.
SHOP HOURS: 9.00am to 6.00pm. Monday to Saturday. ACCESS ORDERS: Simply phone:
Watford (0923) 50234.

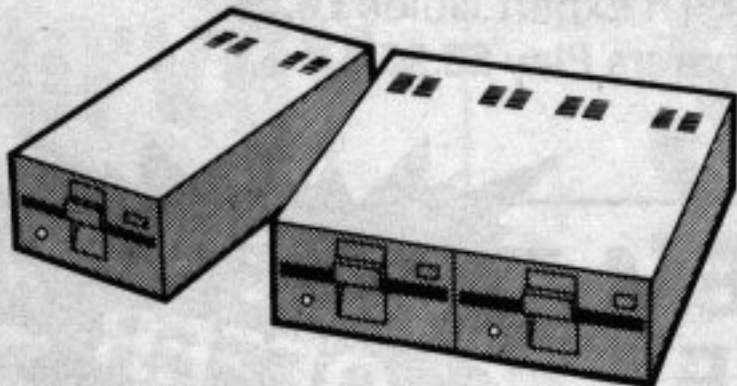
BBC MICROCOMPUTER Model A £299; Model B £399 incl. VAT (carr £7)

UPGRADE KITS. Upgrade your Model A to
Mod. B with our Upgrade Kits and save
yourself £ s s s

- BBC1 16K Memory (8 x 4816AP-3 100nS) **£16.00**
- BBC2 Printer User I/O Port **£6.98**
- BBC3 Disk Interface Kit **£85.00**
- BBC4 Analogue I/O Kit **£6.40**
- BBC5 Serial I/O Kit **£6.70**
- BBC6 Expansion Bus Kit **£6.10**
- Printer Cable Ready made 36" **£11.95**
- Complete Upgrade Kit Mod. A to Mod. B **£43.00**

Complete range of Connectors & Cables available for
BBC Micro. Send SAE for list.

DISC DRIVES BBC COMPATIBLE



- CS50A - TEAC Cased with own Power Supply,
S/S 40 track, 5 1/4", 100K **£180**
- CD50A - TEAC Twin Cased with own PSU,
Single sided, 40 track, 5 1/4", 200K **£350**
- CS50E - TEAC Single Cased with own PSU,
Single sided, 80 track, 5 1/4", 200K **£250**
- CD50E - TEAC Twin Cased with own PSU,
Double sided, 80 track, 5 1/4", 400K **£475**
- CD50F - TEAC Twin Cased with own PSU,
Double sided, 80 track, 5 1/4", 800K **£599**
- MITSUBISHI Slimline - Uncased. Double
density, Double track, 5 1/4". 1 Megabytes, track
density 96TPI, track to track access time
3mSec. Plugs directly to BBC Micro. **ONLY £220**
- Single MITSUBISHI Slimline - Cased with own
PSU. DSDD. 1 Megabytes. (400k with BBC) **£275**
- TWIN MITSUBISHI Slimline Cased with own
PSU. DSDD 2 Megabytes. (800K with BBC). **£535.**
- Single Drive Cable for BBC Micro **£8**
- Twin Drive Cable for BBC Micro **£12**
- 10 Verbatim Diskettes, 5 1/4", S/Sided **£20**
- 10 Verbatim Diskettes, 5 1/4", D/Sided **£30**
- 10 WABASH Diskettes, 5 1/4", S/Sided **£15**
- 10 WABASH Diskettes, 5 1/4", D/Sided **£25**

BBC GP100A PRINTER



10" Tractor Feed,
80 columns, 30CPS
Normal & Double width Char,
Dot res graphics. Parallel Interface standard.
ONLY £175 (£7 carr.)

- SEIKOSHA GP250X 10" Tractor Feed,
80 col. 50 CPS, normal & double width &
height characters, RS232 & Centronics
Interfaces standard. **£235 (£7 carr)**
- Printer Cable to interface above
printers to BBC Micro **£11**

CASSETTE RECORDER & ACC.

Top quality Slim-line, portable Cassette
Recorder for Computer use. Mains/Batt.
operated with counter. **£26**

C12 Computer Grade Cassettes in library
cases. **40p**

NEC PC8023BE-C:



100 CPS, Bi-directional, logic seeking, 80
columns, 7x9 Dot matrix, superscript and
subscript, hi-res block graphics, underlining,
Tractor/friction feed, reverse linefeed, 2K
Buffer, proportional spacing. **£320.00 (carr. £7).**

EPSON Printers FX80

10" Tractor/Friction feed, 160 CPS, 11 x 9
matrix, 137 columns max., Bidirectional, Logic
seeking, proportional spacing, Hi-res bit image,
Italics & Elite Char, Subscript & Superscript.
£395.00 (£7 carr.)

EPSON RX80 Printer

100 CPS, 9x9 matrix, dot addressable
graphics, Condensed and double width
printing, Normal, Italic and Elite Char. Tractor
feed, bi-directional, logic seeking. Centronics
Interface standard.
Only **£295 (Carr. £7)**

MX100FT/3

15" Carriage, 136 columns, plus all the
facilities of MX80FT/3 **Only £425 (£7 carr)**

LISTING PAPER

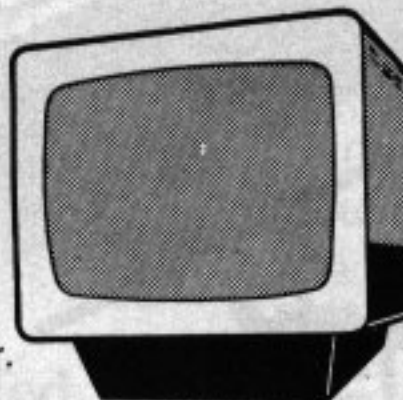
8 1/2" x 9 1/2" Fanfold paper plain or ruled
(1000 sheets) **£7 (150p carr)**
15" fanfold paper (1000 sheets)
£9 (150p carr)
Teleprinter Roll (econo paper) **£3 (£1.50 carr.)**

MONITORS

MICROVITEC 1431

14" Colour Monitor, RGB
Input. (as used in BBC
programs) FREE Interface
Lead. **£249 (carr. £7)**
Interface Lead for Sanyo **£8.**

ZENITH 12" Green Monitor.
Hi-resolution **£75 (£7 carr.)**



BBC FORTH on Cassette

Follows FORTH-79 standard and has fig-Forth
facilities - Provides 260 FORTH words -
infinitely extensible - Full screen editor -
Allows full use of MOS - Permits use of all
graphic modes, even 0-2 (just) - Easy recursion
- Runs faster than BBC BASIC. **ONLY £13**
FREE 70 page manual and a Summary card.

BBC FORTH TOOLKIT

Adds following facilities to FORTH. 6502
Assembler, providing machine-code within
FORTH - Turtle graphics enables easy to use
colour graphics - Decompiler routines enables
versatile examination of your compiled FORTH
programs - Full double number set - An
example FORTH program and graphics
demonstration - Other useful routines - 64
page manual. **ONLY £10.**

READY-MADE LEADS for BBC

CASSETTE LEADS 7 pin DIN Plug
to 5 pin DIN Plug + 1 Jack Plug **£2.00**
to 3 pin DIN Plug + 1 Jack Plug **£2.00**
to 7 pin DIN Plug **£2.50**
to 3 Jack Plugs **£2.00**
6pin DIN to 6 pin DIN Plug (RGB) **£2.50**
Monitor Lead, BNC to PHONO **£3.00**

PRINTER LEAD 36" Ready made
for BBC to EPSON, SEIKOSHA,
NEC, etc. **£11**

RIBBON CABLE LEADS 36" long

(Female Plug at one end, other end free)
SK9 Printer Cable (26 way Female) **£3.15**
SK10 I/O Cable (20 way Female) **£2.40**
SK11 1MHz Bus Cable (34 way Female) **£3.70**
SK12 Tube Cable (40 way Female) **£4.25**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 pin DIN)	30p	45p
RS423 (5 pin Domino)	30p	40p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	15p	25p
Paddles (15 pin 'D')	£1.10	£2.15
Disc to BBC Power Plug 6pin	70p	
Disc Drive Power Plug 4pin	60p	

BBC JOYSTICKS £11.50/pr

LIGHT PEN

All parts available for the Acorn User's
"SHINE A LIGHT" Light Pen article for **£9.95**

GEMINI'S BUSINESS SOFTWARE

Written by professional Chartered
Accountants and coded by competent
programmers. Ideal for small and medium
sized companies. Now available from stock.

- * Cash Book Accounts Package **£82.00**
- * Beebcalc Spreadsheet Analysis **£17.00**
- * Invoices & Statements **£17.00**
- * Commercial Accounts **£17.00**
- * Mailing List **£17.00**
- * Database **£17.00**
- * Stock Control **£17.00**

**Buy any two and we will give one
software package of your choice worth
£17 absolutely free.**

NEW ... NEW ... NEW

BEEBLOTTER

Watford Electronics' BEEBLOTTER will work
with 32K BBC Micro. Connects to Analogue
port. The unique design makes it accurate
and simple to use. The comprehensive
booklet supplied, describes its use in details
and shows some of the possible
applications.

The special features include:-

- * Works in all graphics mode and any colour
selectable.
- * Commands printed on Tablet and
On-screen instructions.
- * Special routines enable pictures to be
quickly loaded from tape.
- * Works with all operating systems and
ECONET. Tape and Disc versions available.
- * Large drawing area (32cms x 23cms).
- * Maps, Pictures and Diagrams produced
quickly and easily.
- * Transparent tablet enables maps and
diagrams to be copied directly from books.
- * Commands include line, circles and
rectangle drawings, infilling, full editing and
an easy to use copy and move feature.
- * Screen dump routines included for Seikosha
and EPSON printers.
- * Routines are included to allow user to
incorporate pictures in their own programs.
- * Designed by a professional teacher with
educational uses in mind.

ONLY £59 (£3 carr.)

Level 9 Software

3 New Adventure games. May be the best yet
written. We strongly recommend them. All
have over 200 individual locations and packed
with puzzles. A game can take easily months
to finish. Only sophisticated compression
techniques can squeeze so much in.

ADVENTURE QUEST (32K) **£8.60**
COLOSSAL ADVENTURE (32K) **£8.60**
DUNGEON ADVENTURE (32K) **£8.60**

* SPECIAL OFFER *

2764-250nS EPROM 1+ **£4.25** 25+ **£3.95**

*** STOP PRESS *** STOP PRESS ***

BBC MICRO DFS

By
Watford Electronics

This new DFS is fully compatible with ACORN DFS and has many more features.

The extra features include:

- Optional Double Directory (gives 62 Files per side)
- 40 Track disc can be read on 80 track drives (software switchable)
- Workfile saves typing of Filenames.
- All Format and Verify commands ROM resident, so no costly utility disc needed.
- Special Commands are included to ease transfer of Cassette programs to disc.
- Optional - Copy command available.

Price: DFS ROM only £42

Complete DFS Kit £85

(P.S. We shall exchange your existing Acorn DFS ROM for this highly superior Watford's BeebRom for £38).

BBC GAMES SOFTWARE

(BUG-BYTE)

SPACE PIRATES	£6.95
SPACE WARP	£7.80
GOLF	£4.75
DRAGON QUEST	£10.00
FRUIT MACHINE	£4.75
CITY DEFENCE	£6.75
MULTI-FILE	£8.75
BACKGAMON	£6.95

(COMPUTER CONCEPT)

ASTEROID BELT	£7.80
CHARACTERS	£5.80
HITCH-HIKER	£5.95
SNAKE	£7.80
SPACE HAWKS	£7.80

(MICRO POWER)

ADVENTURE	£6.95
ALIEN DESTROYER	£6.95
ASTRO NAVIGATOR	£4.95
CHESS	£6.95
COWBOY SHOOTOUT	£5.95
CAT & MOUSE	£4.95
CROACKER	£6.95
ELDORADO GOLD	£5.95
FOOTER	£5.95
GOMOKU	£4.95
GALACTIC INTRUDER	£6.95
LASER COMMAND	£6.95
MARTIANS	£5.95
MAZE INVADERS	£4.95
MUNCHYMAN	£5.95
MASTERMIND	£4.95
MOONRAIDER	£6.95
REVERSI	£4.95
STARTREK	£4.95
SWOOP	£6.95
SEEK	£5.95
TIMETREK	£6.95
ZOMBIES	£4.95

13 ROM SOCKET BOARD

— simply plugs into one of the four sockets currently available on the BBC Micro to give a full 16 ROM socket capability (in which all ROM's may be resident at once). The circuit has been designed to allow the use of RAM in this area too.

KIT — Only £25.00

Ready Built & Tested —
Only £29.95

NEW — NEW — NEW

Watford Electronics' own

BEEBMON

A ROM based machine code Monitor for the BBC Micro. It enables machine code programs to be debugged and altered easily and quickly. Being a ROM, its Commands are always readily available and occupy no USER memory.

The special features includes facilities like: TABULATE, MODIFY, FILL, COPY, COMPARE, SEARCH (Hex & ASCII), CHEKSUM, DISASSEMBLE, RE-LOCATE, SINGLE STOP, SET BREAK POINTS, SCREEN DUMP ROUTINE, DUMB TERMINAL and many more facilities.

Introductory Offer: £18

FORTH ROM for BBC

This superb compiling language now available in ROM. Simply plugs into one of the ROM Sockets. £35.00

Full FORTH Manual £6.75

APPLICATIONS

CONSTALLATION (32K) £6.50

The great Bear! The Southern Cross! The Horned Goat! See the night sky gloriously depicted in hi-res graphics. Constellation has been adapted and enhanced from our successful ATOM program.

DISASSEMBLER (16/32K) £6.95

Relocatable disassembler program. Lists object code and Assembler mnemonics from and to any specified addresses. The listing can be stopped and restarted. Page mode option and output to a printer are available. ASCII symbols may be output if required. The Assembler code may be stored and modified and the program re-assembled.

FILER £8.95

A powerful file handling program for BBC FILER allows the user to build up, manipulate, store and retrieve data on the BBC. A very powerful package indeed.

Wordwise

WORDWISE Model B

Without doubt the most sophisticated piece of software yet written for the BBC Micro. Wordwise contains all the usual word processing features enabling characters, words, sentences or any defined section of the text to be deleted, moved or copied from one part to any other part of the document. The more complex facilities such as search and replace or file handling commands are menu driven so that even a beginner can understand how to operate them. Wordwise will work with whatever filing system is currently implemented. Supplied with full fitting instructions and a spiral bound manual. We believe this word processor compares favourably with those costing many times as much.

Special Offer — ONLY £35.00

LOGO II £9.95

This language is very popular in American schools as it is an ideal educational program. It can graphically demonstrate the ideas of defined procedures, sub-routines, loops and even recursive programming. Gives excellent introduction to LOGO language for young and old alike.

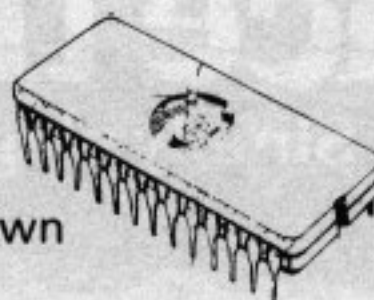
EDUCATION Software

JUNIOR MATHS PACK (32K) £6.95

Makes learning fun for 5-11 year olds. This package consists of 3 programs (menu driven) that increase in difficulty as your child becomes competent. A very good supplement to standard educational methods.

WHERE? £6.95

Do you know WHERE? you are? This well written program, using high resolution graphics offers timed tests on the geography of Great Britain.



WORLD GEOGRAPHY (32K) £7.00
Beautifully drawn Hi-Res colour map of the world illustrates and aids this graded series of tests on capital cities and populations of the world.

WORDHANG £7.80
(Age 7-13). A word guessing program based on the well known Hangman game. Uses full colour graphics. Complete with 260 words and the facility save your own list of words.

WORLDWISE £7.80
(Age 7-15). Two constructive geography programs allowing children to build detailed data bases covering both the UK and the world. Encourages children to refer to atlas and reference books. Save the database anytime.

ANIMAL/VEGETABLE/MINERAL £4.95

(Age 7-13). Provides an opportunity for children to teach the computer to differentiate between objects. The program tries to guess the object the child has thought of, using personalised responses like Mmm... I am thinking.

BRITISH GEOGRAPHY £6.95

Teaches a child the locations of Cities and Ports using directional keys.

CAROUSEL £4.35

Aimed at junior school age. Sequences of colours and sounds teaches a child to concentrate.

HAPPY NUMBERS £7.80

(Age 4-6). No reading skills are required to use this colour graphics number recognition and counting program. Children build patterns of flowers corresponding to figures, quickly learning their significance.

INTRO TO ARITHMETIC £10.45

4 programs — Additions, subtractions, multiplications and divisions. Help stage, moving graphics and colours. Worksheet produced at the end of program. (5-7 years old).

WRITING £4.80

Full screen demonstration of correct formation of lower case alphabetic characters. Several choice of sequence (5-7 years).

PROGRAMMING MADE EASY ONLY £8

A new concept for schools — A set of workcards to introduce programming to primary school pupils. An invaluable asset to Teachers and Parents alike. The language has been carefully chosen to provide a balance between 'Computer Terminology' and standard language. Bulky and often despised text books have been replaced by the set of Workcards. Each card can be handled easily at the Computer Keyboard. Also included are a SUPPORT PROGRAM specially produced to reinforce the work covered by the cards and a CHECK LIST for children and teachers to monitor progress. A must for primary schools undertaking computer learning.

BOOKS (No VAT on Books)

30 Programs — BBC Micro	£4.95
30 Hour BASIC (BBC Micro)	£6.00
6502 Application Book	£10.25
6502 Assembly Lang. Programming	£12.50
6502 Assembly Lang. Subroutines	£11.80
6502 Software Design	£10.50
ACORN ATOM Magic Book	£5.50
Advanced 6502 Interfacing	£10.95
Assembly Lang. Programming for BBC	£8.95
BASIC programming of BBC Micro	£5.95
BBC Micro Revealed	£7.95
BBC Micro Instant Machine Code including Software Cassette	£34.00
Creative Graphics on BBC Micro	£7.50
Discover FORTH — Osborne	£11.25
Easy Prog. for BBC Micro	£6.50
Further Prog. for BBC Micro	£6.90
FORTH Programming (Sams)	£12.50
Getting Acquainted/Acorn ATOM	£7.95
Graphs & Charts on BBC Micro	£7.50
Intro to Micro Beginners Book (3 Ed)	£9.90
Let your BBC teach you to program	£6.75
Micros in the Classroom	£4.90
Practical Prog. for BBC & ATOM	£5.95
Programming the 6502	£10.75
Mastering VISICALC (Sybex)	£11.95
Structured Prog. with BBC BASIC	£9.50
The BBC Micro An expert Guide	£7.90

WATFORD ELECTRONICS

CARDIFF ROAD, WATFORD.

Tel: (0923) 40588. Telex: 8956095

AMS

announce the 3" disk drive

Simply plug in—ready to run



- * Format and verify utilities on disk or EPROM
- * Interface cables
- * Manual
- * Free disks

* 100k—£225

* 200k—£399

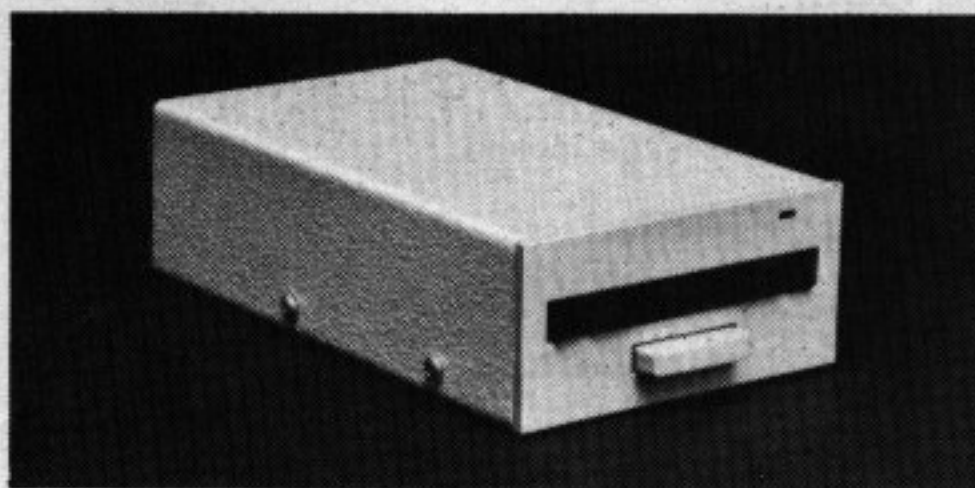
includes VAT and delivery to your door

NB When used with some computers, both drives and disks have a double density capability. Educational and Institutional orders welcomed.



Japan, home of the major disk drive manufacturers, has decided to make the new 3" disks a standard. And no wonder. Not only are they strong and easily stored, they give 100K per side, and you simply flip them over in the same way as a music cassette. The small light on the casing reminds you which side you are using. The disk is totally encased in rigid plastic, with no exposed surfaces, is easily inserted with one hand and simply removed by pressing the eject button. A unique feature of the new disks is a mechanical tab which prevents overwriting of precious data. And of course, you can switch it back when necessary.

The neatest and best disk option ever
We've taken the brilliantly engineered and proven Hitachi 3" drive and housed it in rigid steel, textured and coloured to match your BBC Micro. And we've added cables, manuals, utilities on disk and EPROM, free disks—everything you need to upgrade your machine.



Reliable and Robust

The Hitachi drive boasts a brushless direct drive motor, the best possible system for trouble-free use. AMS-3 units simply run off the BBC power supply—they don't need their own supply and there's no need to worry about corrupt data.

The standard interface lets you use the disk drive with most other computers and in tandem with 5¼" drives.

High Speed Access

The disk drive provides a track-to-track access time of only 3mS, much faster than old-fashioned drives.

Reliable delivery

You can now order your AMS-3 by mail order direct from Advanced Memory Systems Ltd. The units are delivered by courier service, complete with everything you need to get started. Just plug in the cables, and away you go.

Fill in the coupon below and we will send it to you with our full no-quibble money-back guarantee. Advanced Memory Systems Ltd, Woodside Technology Centre, Green Lane, Appleton, Warrington, Cheshire WA4 5NG.

TO: Advanced Memory Systems, Ltd, Woodside Technology Centre, Green Lane, Appleton, Warrington, Cheshire WA4 5NG.

Please send me by door-to-door courier:

_____ (qty) AMS-3 (S) single disk drive at £225 each with free disk.

_____ (qty) AMS-3 (T) twin disk drives at £399 each with two free disks.

(Prices include EPROM, utility disk, cables, manual, VAT and delivery).

Please send me by post, if not with drives:

_____ (qty) double sided (100K x 2) disks at £4.95 each.

_____ (qty) packs of five at £22.50 per pack.

_____ (qty) utility EPROM at £15.

I enclose a cheque for £_____

Name _____

Address _____

Post Code _____

Tel No _____

Signature _____

Please allow up to 28 days for delivery.

Epson FX80

-fast

and flexible

EPSON, best known as manufacturers of medium priced dot matrix printers, have recently released two new models.

These replace the workhorse of their range the MX80, which has had an enviable reputation for reliability.

The replacements are the FX80, which is around the same price as the MX80, but has more features and double the printing speed, and the RX80, a cheaper model which appears to be aimed more at the home user market. This review concentrates on the FX80.

The printer is housed in a low cream case, somewhat wider and heavier than the MX80, measuring 100 x 420 x 347mm and weighing 7.5kg.

On the top on the front right hand corner is a small control panel with three switches (on/off line, form feed and line feed) and four status lights.

An easily removable hinged lid gives access to the ribbon cartridge and printer head. There is also a brown plastic strip to cover the platen, but this must be removed to adjust the width for continuous paper. To the left of the platen is the paper release lever for the friction feed.

The manual supplied is well produced and spiral bound. It is written in good clear English, with a new page for each command and often including an example of its use.

However since this printer can be used by a large number of different micros, the examples are given in Microsoft Basic which sometimes requires deciphering to find the best way to translate it into BBC Basic.

For instance the control codes are sent as a stream of LPRINT CHR\$ and LPRINT "string" statements, whereas it is easier to use the VDU command of BBC Basic.

The best way round this problem is to pencil into the manual the equivalent Ascii value for each string value.

Loading continuous paper is a bit more fiddly than on the MX80, but if you follow the instructions to the letter you should have little difficulty.

Connecting the FX80 to the BBC Micro is easy. All that is needed is a 20 way ribbon cable with a 26 way ribbon header at one end and a 36 way Amphenol (for the FX80) plug at the other.

If you don't want to make one up yourself a dealer will supply one for about £15 to £18.

A small panel on the right of the

printer buffer, or used to store software defined characters.

- Whether the internal buzzer will sound.
- Automatic line feeds (useful to set ON, to match the Beeb default).

In use the most striking feature is the speed at which the printing takes place. The FX80 has bidirectional printing rated at 160cps – noticeable when compared alongside an MX80 with half the speed. And especially so alongside a daisy wheel rated at 15cps!

If all that speed is too much for you, there is a half speed mode which prints more quietly.

A large number of different printing modes are available and even combinations of these modes are possible.

There is a proportional spacing mode if you really want to impress. See the panel below for some of the other print modes.

Although there are nine different international character sets in the printer, there isn't one that precisely matches the BBC Micro's character set, although the American one comes closest.

The speed of printing in the graphics modes is also very welcome. A full graphic dump in Mode 0 took only 100 seconds. In the other modes it took only 50 seconds. Since the printer is no slowcoach, having a good graphic dump program is necessary to make the most of the speed. (I foresee many graphics dump routines being rewritten!)

This machine has a large number of features which allow it to be tailored to the user's requirements, whether it be text or graphics.

To appreciate this you really need to see it in action. This flexibility in use enables it to make a formidable combination with the BBC Micro.

Although it is not cheap, it certainly gives value for money.

Review by JIM NOTMAN

printer can be removed to expose a number of DIP switches. Depending on the position of these switches a number of "startup" options are available.

These control:

- The selected international character set.
- Column width.
- Whether the zero has a "slash" across it.
- Print mode.
- Operation of the paper-end detector.
- Whether 2k of RAM will be a

Normal print

_{SUBSCRIPT}

Elite size

^{SUPERSCRIPT}

Enlarged

Underline

Condensed

Double-strike

Condensed Enlarged

Emphasized mode

Italics

Proportional spacing

What the FX can do

Now win your own FX80. Full details overleaf

THE MICRO USER

THIS month's competition is open to everyone, expert programmer or not. All you have to do is to solve our crossword puzzle.

The answers are based on programming the BBC Micro, so you'll have to know a bit about that. Mind you, that won't be a problem if you're a regular *Micro User* reader.

Oh yes, there's one more thing: We've already given you the answer to 16 across. But we forgot to include the clue.

We want you to devise what you consider would be the most appropriate clue for the letters "BBC".

The magnificent prize will be Epson's latest printer, the FX80, reviewed this month by Jim Notman.

To be in line for it, all you have to do is to send in the coupon containing the completed crossword, together with your clue for the letters "BBC".

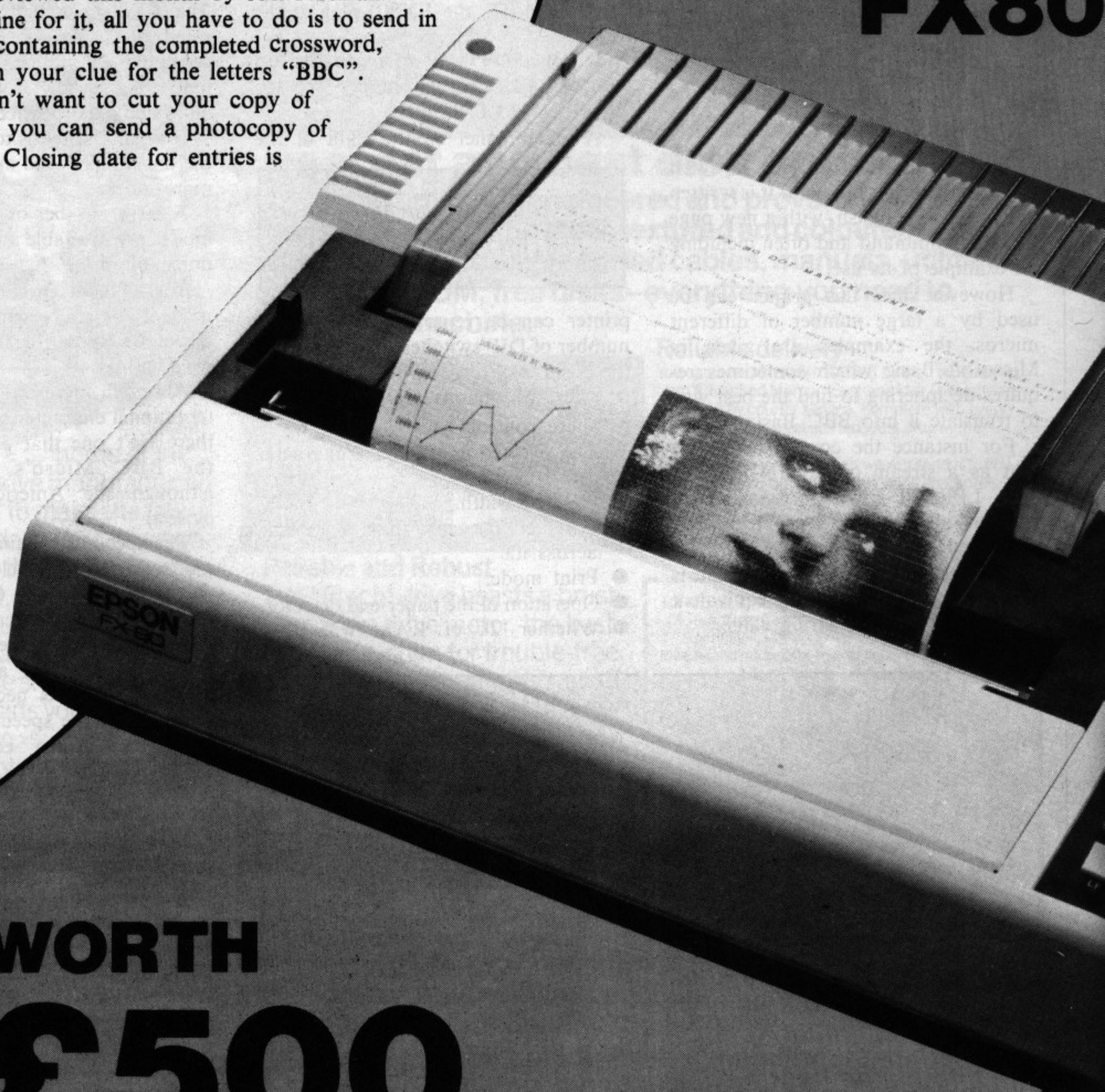
If you don't want to cut your copy of *Micro User* you can send a photocopy of the coupon. Closing date for entries is July 31.

Get clued

WI

Epson's

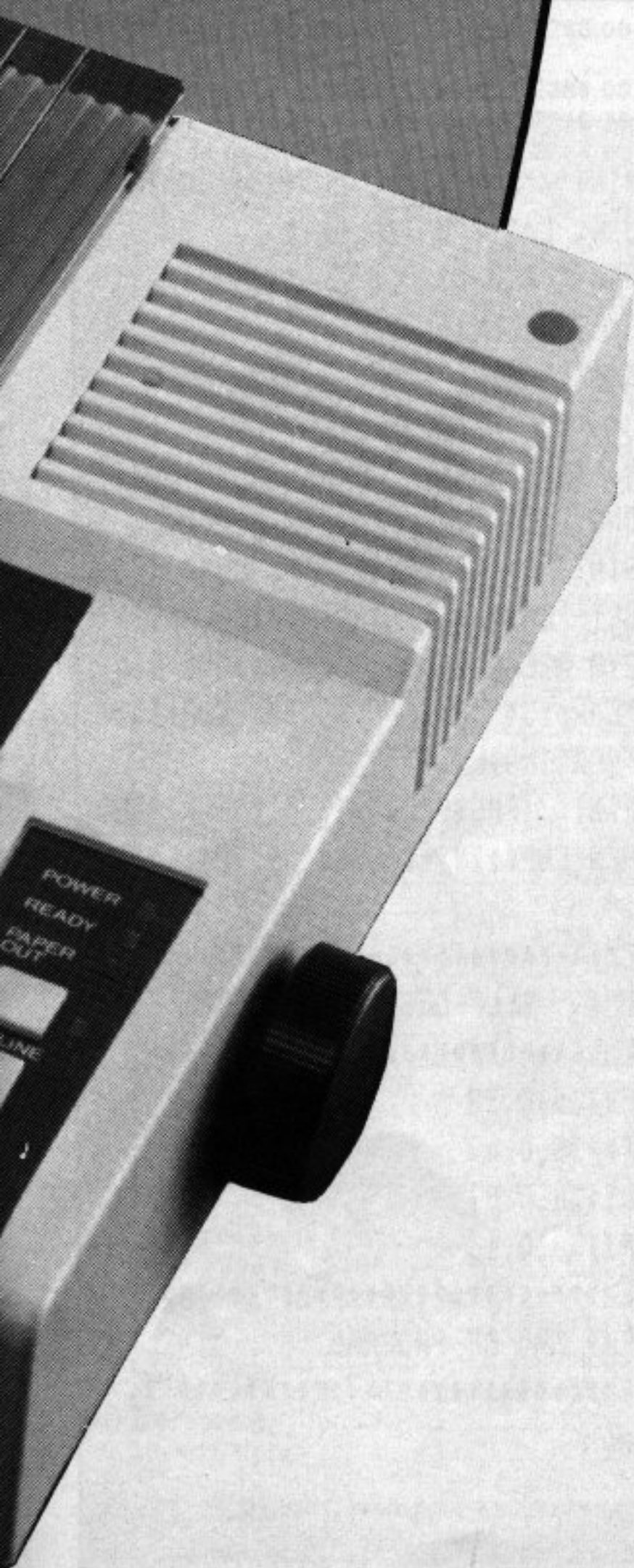
FX80



WORTH

£500

up and
N
latest
printer



CLUES

ACROSS

- 1 and 24 Automated language? (6,4)
6 and 9 The best way to get from A to B ... and beyond (6,4)
8 Play it again, Sam (6)
10 You have a choice (3)
12 Fundamental language (5)
14 You can see it through the wrong slit (4)
17 and 20 Small-time operator? Not us! (5,4)
22 We all crave it ... but there's never enough (4)
26 Plot 64-71 (3)
27 If you lose the money, it's just a number (8)
29 Strangely enough, it can be found anywhere (3)
30 Actually it's all very logical (6)
31 Sounds like procedure needs a little aid (7)

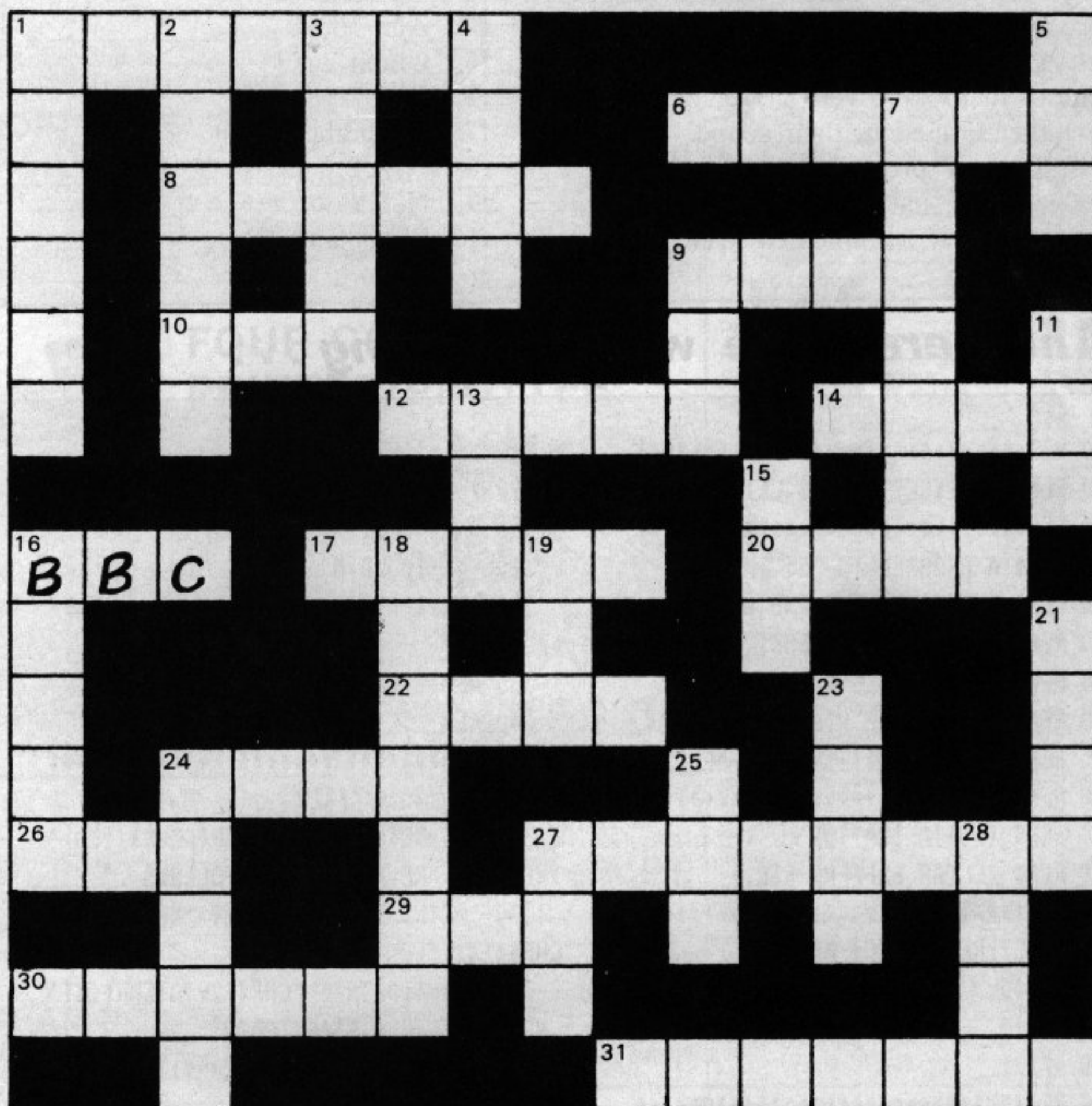
DOWN

- 1 and 16 Fed-up female? (6,5)
2 Without it you would never know where you

were (6)

- 3 You'll get it with a little prompting (5)
4 The answer is in the value. Work it out! (4)
5 A brief comment (3)
7 Slightly clever? (7)
9 Room to breath? (3)
11 A function in that new ROM (3)
13 --- and you'll receive the code (3)
15 and 21 Would ointment help this software house? (3,4)
18 There's no point in these variables! (7)
19 The larger it is, the more powerful the weapon (3)
23 Plot 5 (4)
24 Everybody's trying to. Depressing isn't it? (5)
25 Interrupt your rest (3)
26 A driver on the telly? (3)
28 Sign language (4)

-----Your FREE entry form-----



My clue for the letters "BBC" is

Name

Address

Tel No

Send this completed entry form to:
Printer Contest, Micro User, Europa House,
68 Chester Road, Hazel Grove, Stockport SK7 5NY.

The man from Beddau collects a Cumana disc drive



THE lucky winner of the contest in the May issue of *Micro User* was Mr H.C. Leivers of Beddau, near Pontypridd. A new Cumana disc drive is on its way to him.

The competition, which was to write a program to set up the function keys, attracted a large number of entries. Some of them were very clever indeed but rather limited in their scope.

Mr Leivers' program was simple to use, generally useful and — always a nice touch — it documented itself.

The program sets up the keys as follows:

- f0 Amount of free memory
- f1 Program length
- f2 Paged list
- f3 Cassette verify
- f4 Alter page
- f5 Chain
- f6 Run
- f7 Renumber
- f8 *CAT
- f9 *KEY
- f10 Break and Old

It then deletes itself from memory, ready for other programs.

As it stands, the program works on OS 1.0 and 1.2.

Lines 160,170 would have to be omitted for OS 0.1. Also lines 520,580 — the self-destruct routine — would have to go.

As these are just a clever way of entering NEW from the program you can omit the lines and simply enter NEW yourself after running the program.

And here's the winning listing . . .

```

10 REM*****
20 REM: ##KEYSET by H.C.LEIVERS##
30 REM*****
40 REM: A PROGRAM TO SET THE
50 REM: FUNCTION KEYS AND WHICH
60 REM: WILL SELF-DESTRUCT, LEAVING
70 REM: ONLY THE KEYS SET.
80 REM: (i.e. THERE WILL BE NO
90 REM: TRACE OF IT IN USER-MEMORY)
100 REM*****
110 REM: INITIALISATION
120 REM: (CLEAR BUFFERS ETC.)
130 REM*****
140 MODE7:REM SELECT MODE 7
150 *FX15
160 *FX18
170 *FX21
180 REM*****
190 REM: ROUTINE TO SET UP KEYS
200 REM*****
210 *KEY0:V70%0:DIMPZ-1:P.H.-PZ" BY
    TES FREE, FROM &"~PZ:IL:IM
220 *KEY1:V7P."PROGRAM IS ";LOMEM-PA
    GE;" BYTES LONG":IL:P:IM
230 *KEY2:V7LIST00:IM:NL:IM
240 *KEY3:V7*LOAD""8000:IM
250 *KEY4:V7PAGE=
260 *KEY5:V7CHAIN"":IM
270 *KEY6RUN:IM

```

```

280 *KEY7:V7RENUMBER
290 *KEY8:V7*CAT:IM
300 *KEY9*KEY
310 *KEY10OLD:IM
320 REM*****
330 REM  TITLE PAGE AND DESCRIPTION
340 REM      OF FUNCTIONS
350 REM*****
360 CLS:PRINT:PRINT:PRINT"CHR$(130)"
    THE KEYS ARE NOW SET AS FOLLOWS.."
370 PRINT:PRINTCHR$(129)"KEY "
    CHR$(131)"FUNCTION"
380 PRINT:PRINT" "CHR$129"0"CHR$131"
    .MEMORY FREE & START POINT"
390 PRINT" "CHR$129"1"CHR$131".PROGR
    AM LENGTH"
400 PRINT" "CHR$129"2"CHR$131".LIST(
    PAGED;CTRL-B ENABLES PRINTER)"
410 PRINT" "CHR$129"3"CHR$131".VERIF
    Y"
420 PRINT" "CHR$129"4"CHR$131".ALTER
    PAGE(ENTER START ADDRESS)"
430 PRINT" "CHR$129"5"CHR$131".LOAD
    AND RUN"
440 PRINT" "CHR$129"6"CHR$131".RUN"
450 PRINT" "CHR$129"7"CHR$131".RENUM
    BER (PARAMETERS AND RETURN)"

```

```

460 PRINT" "CHR$129"8"CHR$131".CATAL
    OGUE (TURNS CASS. MOTOR ON)"
470 PRINT" "CHR$129"9"CHR$131".*KEY(
    FOR QUICK REDEFINITION)"
480 PRINTCHR$129"10"CHR$131".BREAK A
    ND OLD"
490 PRINT:PRINT"      -THE PROGRAM HA
    S NOW GONE,BUT"
500 PRINTCHR$141CHR$129"THE KEYS ARE
    STILL SET!"CHR$140:PRINTCHR$141CHR$12
    9"THE KEYS ARE STILL SET!"CHR$140:PRIN
    T"ENTER"CHR$134"CTRL-L"(CLS) "CHR$135
    "BEFORE CONTINUING.";
510 PRINT" (PRESS"CHR$133"BREAK"CHR
    $135"THEN"CHR$129"42"CHR$135"TO LIST
    PROGRAM)"
520 REM*****
530 REM: SELF DESTRUCT ROUTINE
540 REM*****
550 *FX138,0,78
560 *FX138,0,69
570 *FX138,0,87
580 *FX138,0,13
590 REM*****
600 REM: END OF PROGRAM
610 REM*****
620 END

```


Computerama

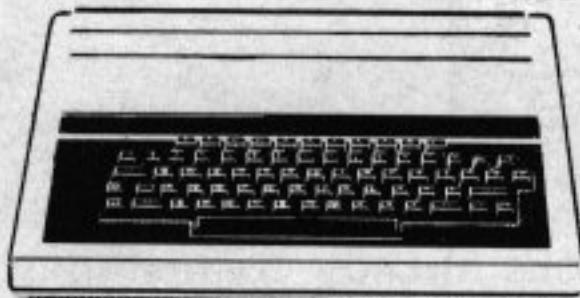
The Midlands

Home Computer Specialists

**WALK IN.
TRY ANY
COMPUTER
ANYTIME.**

**FOR EDUCATION
BUSINESS & LEISURE
ACORN SAME DAY
COMPUTER DESPATCH
DEALER ON STOCK
TELEPHONE FOR
LATEST PRICE
CHANGES**

BBC	Inc. VAT
Acorn Electron	T.B.A.
BBC Model B	£399.00
BBC Model B + Disc/Int	£499.00
BBC Disc Interface	£109.00
BBC A/B Full Upgrade	P.O.A.
BBC Teletext Receiver	£225.00
BBC 6502 2nd Processor	£299.00
BBC Z80 2nd Processor	£289.00



BBC DISC DRIVES	Inc. VAT
Acorn/LVL single 100K drive (expands to Double)	£265.00
Acorn/LVL dual 100K drive	£389.00
Pace single 100K drive	£212.75
Pace dual 100K drive	£388.00
Pace dual 40/80 track switchable double sided drive 800K	£699.00
Pace single version of above	£368.00
Torch dual 400k Z80 + 64K disc pack	£895.00

MONITORS	Inc. VAT
Microvitec 14" colour	£287.00
Sanyo 14" colour	£269.00
Sanyo 12" green monitor	£89.00

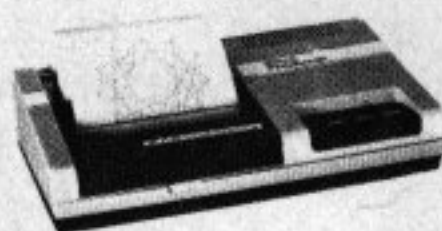
ACCESSORIES	Inc. VAT
Cassette Deck BBC compatible	£29.95
Cassette Leads - all types	£2.80
BBC Joysticks	£13.00
Printer Cable (Parallel)	£10.00
BBC Dust Cover	£5.95
Light Pen	P.O.A.
Data Cassettes C12/C15 50p/65p	

PRINTERS	Inc. VAT
Shinwa CP80	£329.00
Star DP510	£329.00
Seikosha GP100A	£219.00
Epson RX80	£349.00
Epson FX80	£459.00
NEC PC8023	£368.00
Smiths Corona TA1	£489.00
Juki 6100 Daisywheel	£459.00

BOOKS	Inc. VAT
30 Hour Basic	£5.95
A.L.P. for BBC Micro	£8.95
BBC Revealed	£7.95
Let your BBC Micro teach you to program	£6.95
Basic Programming on the BBC Micro	£5.95
Creative Graphics	£7.50
Graphs & Charts	£7.50
Lisp Manual	£7.50

Forth Manual	£7.50
35 Educational Programs for the BBC	£6.95
30 Progs BBC	£4.95
Further Programming for the BBC Micro	£5.95
Programming the BBC	£6.95
Using Floppy Discs with the BBC	£10.00
6502 M/C for Beginners	£5.95
Programming 6502 (Sybex)	£10.75

A&F SOFTWARE	Inc. VAT
Painter	£8.00
Planes	£8.00
Frogger	£8.00
Lunar Lander	£6.95
Pharaohs Tomb	£8.00
Tower of Alos	£6.95



FOUR COLOUR PRINTER/PLOTTER

- High resolution graphics.
- Alpha numeric printing
- 40 and 80 column
- 12 CPS
- Black, blue, green and red colour pens
- Complete with eight pens + paper roll



**ONLY
£169.00**

I.J.K. SOFTWARE	Inc. VAT
Atlantis	£7.50
Leapfrog	£7.50
Hyperdrive	£6.50
Invaders 'B'	£7.50
Mutant/Breakout	£6.50
Strato Bomber	£7.50
3D Maze 'B'	£4.50

PROGRAM POWER	Inc. VAT
Moonraider	£7.99
Cat & Mouse	£5.70
Chess Model B	£7.99
Cowboy Shoot Out	£6.85
Croaker	£7.99
Eldorado Gold	£6.85
Galactic Commander	£7.99
Junior Maths	£6.85
Laser Command	£7.99
Martians	£6.85
Maze Invaders	£5.70
Munching Man	£6.85
Seek	£6.85
Swoop	£7.99
Time Trek	£7.99
World Geography	£6.85
Where	£6.85
Micro Budget	£7.99

BUG BYTE	Inc. VAT
Dragon Quest	£11.50
Golf	£5.50
Polaris	£5.50
Space Warp	£9.00
Music Synth	£9.50
Galaxy Wars	£7.50
Sea Lord	P.O.A.
City Defence	£7.50
Solar Soft	£6.50
Zany Kong	£6.50

CLARES	Inc. VAT
Graphkey	£7.95
Graphstick	£7.95
Graph Disc	£12.95
Beebsynth	£7.95
The Key (disc only)	£12.95

BBC/ACORNSOFT	Inc. VAT
Castle of Riddles	£9.95
Algebraic Manipulation	£9.95
Arcade Action	£11.90
Arcadians	£9.95
Business Games	£9.95
Chess	£9.95
Creative Graphics	£9.95
Countdown to Doom	£9.95
Cube Master	£9.95
Desk Diary	£9.95
Forth	£16.85
Graphs & Charts	£9.95
Lisp	£16.85
Missile Base	£9.95
Meteors	£9.95
Monsters	£9.95
Peeko Computer	£9.95
Philosophers Quest	£9.95
Planetoid	£9.95
Rocket Raid	£9.95
Sliding Block Puzzles	£9.95
Snooker	£9.95
Sphinx Adventure	£9.95
Starship Command	£9.95
Super Invaders	£9.95
Tree of Knowledge	£9.95

MAIL ORDER

Post your order today to:
**Computerama, 1 Sash Street,
Stafford ST16 2PS.**
Or telephone your Access or
Barclaycard number, we will
despatch immediately (0785) 41899.
Call in today. See the Midlands
Home Computer Centre for the BBC
enthusiast.
Send large S.A.E. for further details
of any product.

CARRIAGE COSTS

Micro's, Monitors, Disc Drives,
Printers £8.00. Books £1 each.
Cassette Decks £2.00. Leads and
software 50p/item.

computerama

The Midland's Home Computer Specialists.

STAFFORD
59 Foregate Street, Stafford,
ST16 2PR. Tel: (0785) 41899

STOKE-ON-TRENT
11 Market Square Arcade,
Hanley, Stoke-on-Trent,
ST1 1PD.
Tel: (0782) 268620

BBC
SERVICE
INFORMATION
CENTRE

SHREWSBURY
13 Castle Gates, Shrewsbury
SY1 2AB. Tel: (0743) 60528



THE idea behind a digitiser or graphics tablet is a simple one. A drawing is positioned on the tracing pad and the tracing probe moved over the picture. During this process the computer makes a record of the data and draws the picture on its own screen.

The PL Digitiser package consists of a digitiser, a control program, a shorter display program and a very detailed manual. The programs are available on tape or disc. I used the tape version.

The program works on all operating systems and requires a model B or a model A with 32k of ROM and the analogue port.

The digitiser is of a very solid wooden construction which could support a monitor. The tracing pad is mapped out in a rectangular grid to facilitate composition.

Connection of digitiser to computer is straightforward. The Index program, which details the programs and files on the tape, calls the main control program.

The first prompt is to "Place the probe at A" and press A, followed by "Place the probe at B" and press B. This is in order to calibrate it.

If the digitiser voltages are outside preset limits then you are requested to repeat the operation. If this fails it may be necessary to adjust the potentiometers which provide the voltages to map the tracing pad. This is not too difficult.

The digitiser can map the probe to about 1mm, or 5 units on the graphics screen.

The red programmable keys control the following options:

- f1 *Enter Instruction mode*
- f2 *Enter Edit mode*
- f3 *View picture*
- f4 *Read picture file*
- f5 *Create picture file*
- f6 *Dump screen to printer*
- f8 *Restart the program*
- f9 *End program*

After initialisation you choose the graphics mode, either mode 4 and two colours or mode 5 and four colours. As always in any graphics program, a compromise has to be made between the memory to be used for the display and the memory allocated for the program and the data.

An extra 10k of memory is available

for the program if modes 0, 1 or 2 are not used, hence the restricted modes available.

To draw or copy a picture you enter the Instruction mode by pressing f1. At this stage the versatility of the system becomes obvious.

You have the choice of drawing lines of any shape, straight lines, rectangles, circles, filling the shape with colour with or without an outline.

The width of the lines can be ad-

By JOHN LORD

justed, as can the foreground and background colours and the GCOL mode used. Initially the colours take default values.

The GCOL mode controls the effect when two coloured regions overlap and some interesting effects such as stripes can be generated.

One interesting feature is the way you write text. When you type it in its position is not immediately fixed. The centre of the first character is "tied" to the cursor, so moving the probe causes all the text to be moved. It can then be positioned by trial and error before being fixed.

The Edit mode, entered by pressing f2, is one of the most important features of this package. The sequence

of instructions already created may be reviewed and modified.

The displayed image can be moved to a new position and a duplicate drawn. In addition the displayed image can be enlarged or reduced about a point on or off the screen.

Pressing f3 allows you to view the picture produced by the sequence of instructions up to the first halt marker.

Pressing f4 enables picture files which have been saved on tape to be loaded into the computer, provided that there is sufficient room.

Pressing f5 saves picture files on tape or disc.

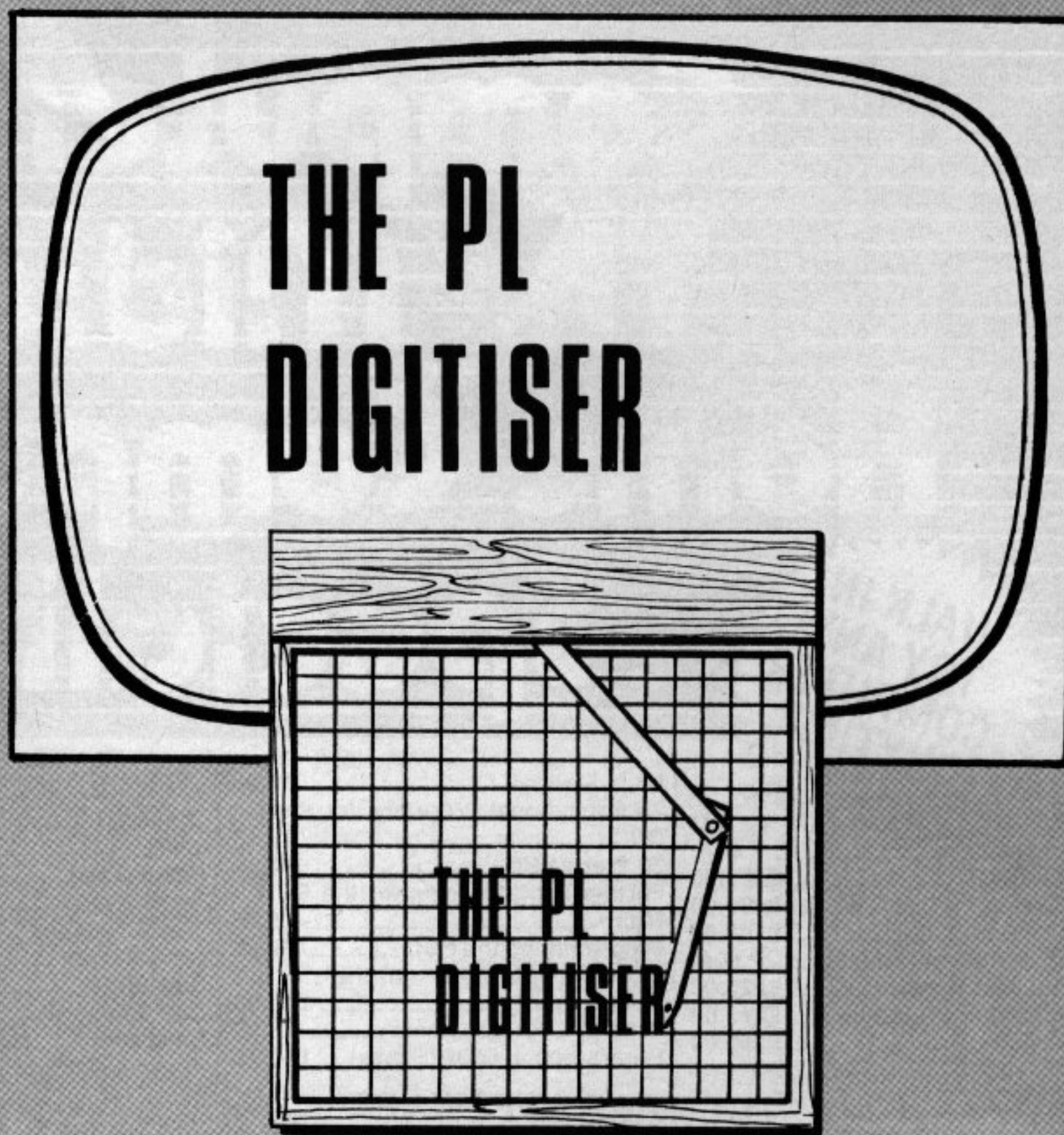
Pressing f6 dumps the screen to a printer. At the moment the routine is in Basic and so is rather slow but effective.

In addition to the index and control programs, a much shorter display program is included which you can use in your own programs to display picture files you have previously created with the digitiser.

This is a well-engineered package which should give long and reliable service.

While it is quite simple to use at first, to take full advantage of all the facilities offered you should read the manual thoroughly.

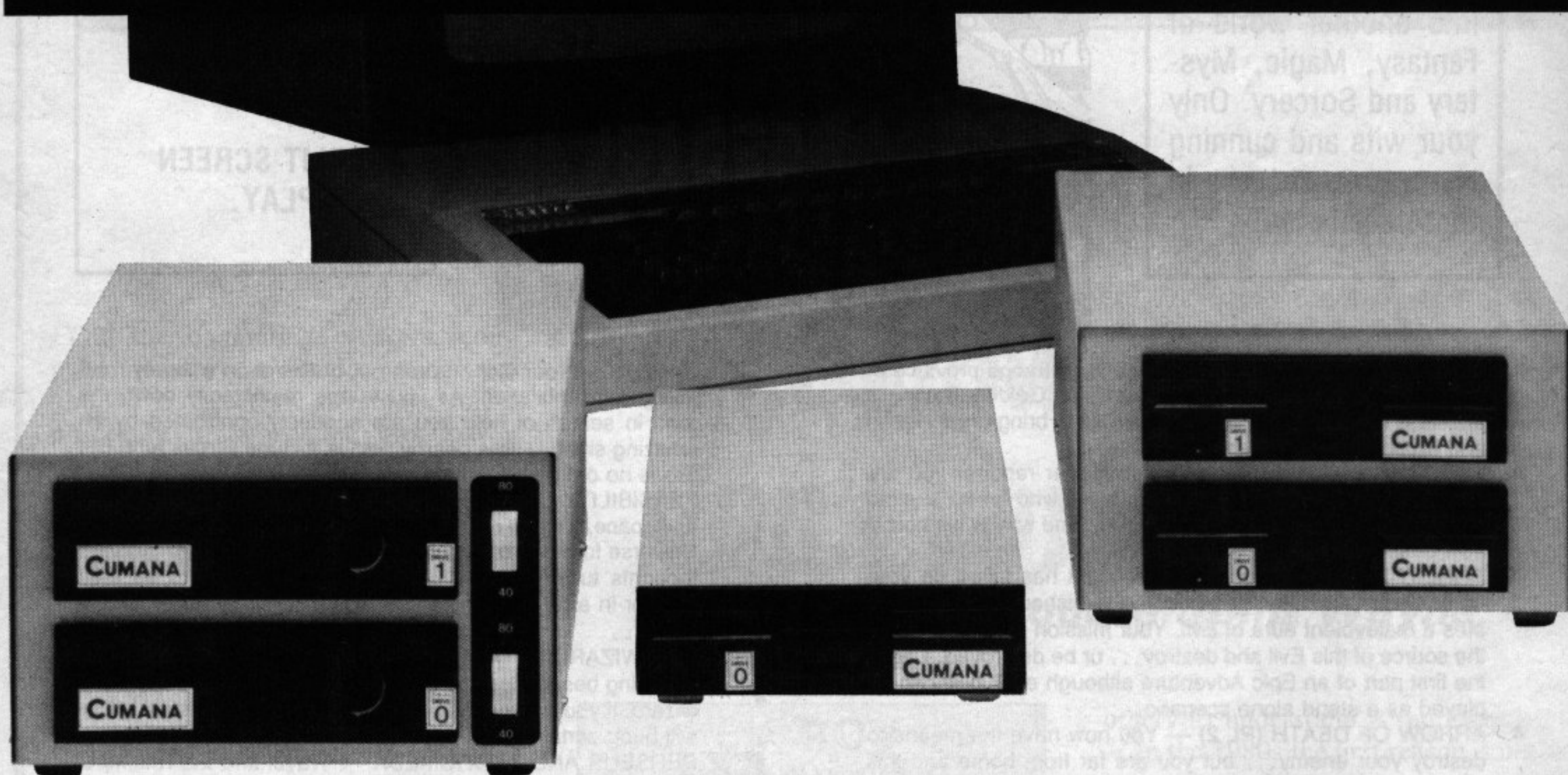
It would have been useful if more illustrative exercises had been provided. Despite this, the digitiser will prove invaluable in all sorts of applications, particularly educational.



CUMANA

High quality Japanese

5 $\frac{1}{4}$ " Disk Drives



Cumana quality **DISK DRIVES** are complete with their own Power Supply Unit and the Disk Drives are fully compatible with the BBC Model B Micro Computer.

Storage capacities from 100K to 800K in single and dual units; 12 months Warranty.

Disk Formatter and User Guide £15.00.

Disk Drive prices from £199.

Dealer enquiries welcome.

Educational Discounts available.

Add VAT to all prices.

CUMANA LTD

The Pines Trading Estate,
Broad Street, GUILDFORD, Surrey. GU3 3BH.
Tel. (0483) 503121 Telex: 859380

For further details complete & return this coupon.

Name

Address

.....Tel. No

Interests:

Dealer ☐

Education ☐

Business ☐

Home Use ☐

Please send:

Brochure ☐

Data Sheets ☐

Dealer Address List ☐



MYSTERIOUS ADVENTURES



FOR BBC MICROCOMPUTER MODELS A & B*

Join the growing band of Adventurers who are enjoying these absorbing and stimulating programs. Step into another world of Fantasy, Magic, Mystery and Sorcery. Only your wits and cunning can ensure success in these scenarios!



- WRITTEN IN ULTRA-FAST MACHINE CODE.
- SAVE GAME FEATURE.
- SPLIT SCREEN DISPLAY.

1. **THE GOLDEN BATON** — Venture into a strange province of Sorcery and Evil Magic to recover the Golden Baton, a priceless artifact whose powers are said to bring great Health and Prosperity to the Land.
2. **THE TIME MACHINE** — As a Newspaper reporter you are sent to investigate the eccentric professor who lives in the old house on the Moors. What is his secret and why is his house now deserted?
3. **ARROW OF DEATH (Pt. 1)** — A blight has fallen on your homelands, the Baton has become tarnished and now radiates a malevolent aura of Evil. Your mission is clear — trace the source of this Evil and destroy... or be destroyed. This is the first part of an Epic Adventure although each part can be played as a stand alone scenario.
4. **ARROW OF DEATH (Pt. 2)** — You now have the means to destroy your enemy... but you are far from home and this land is strange to you. Can you cope with the deadly perils which approach you and have you the strength to see your mission through to the final conflict?
5. **ESCAPE FROM PULSAR 7** — Alone on a gigantic Space-Freighter... The rest of your crew have died horribly at the hands of a mutated Zoo-Specimen. Your only chance of escape is to reach the Frail Shuttlecraft. But the lurking Monster is hungry and you are the only food it has left...
6. **CIRCUS** — Your Car has run out of Petrol on a lonely road miles from habitation. As you trudge reluctantly down the road in search of help you are suddenly confronted by an amazing sight... in a nearby field is a Huge Circus tent! But this is no ordinary Circus as you will soon discover...
7. **FEASIBILITY EXPERIMENT** — Far across the gulfs of time and space, a dying race of super-intelligent beings search the Universe for a Hero to save their existence... At length their thoughts turn to planet Earth. You are chosen to be their saviour in a bizarre scenario where death is a mere thought away...
8. **THE WIZARD OF AKYRZ** — You are in the Royal Palace. The King beseeches you to rescue his daughter from the evil wizard. If you succeed your reward will be priceless... failure will bring certain death.
9. **PERSEUS AND ANDROMEDA** — Travel into the realms of ancient mythology. Battle with grotesque monsters and supernatural powers as you search for the hidden secrets of myth and legend.
10. **TEN LITTLE INDIANS** — This mystery begins with a train journey into a strange country. What secrets are held by the strange country mansion? What meaning is attached to the strange idols? Maybe you will find out if you live long enough...

* Adventures 5-10 inc. require 32K RAM

Each adventure comes attractively packaged for just £10.29 inc.

Available soon for ZX SPECTRUM, ZX81 (16K), APPLE II.



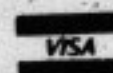
SEND CHEQUE OR P.O. TO:

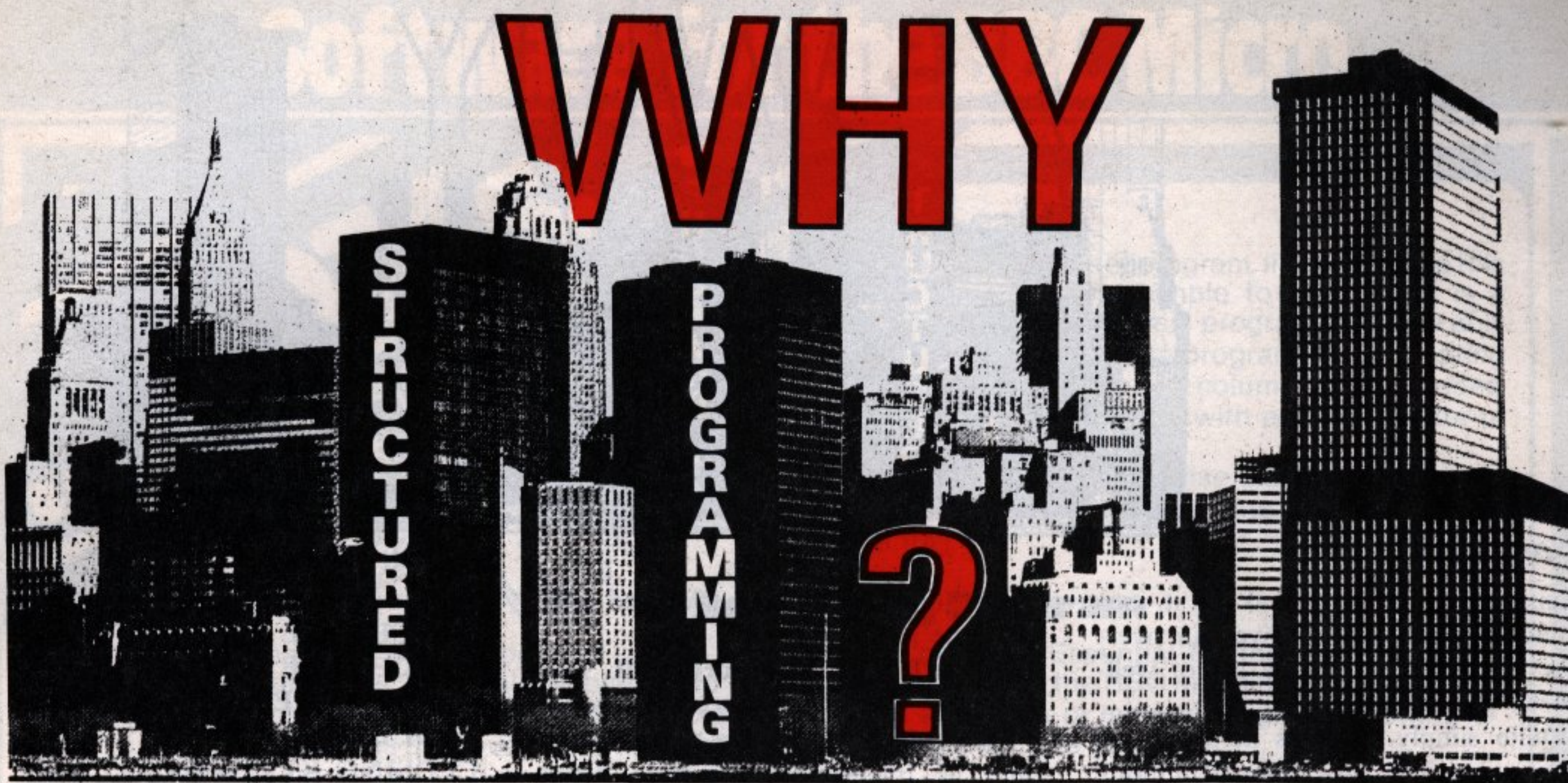
DIGITAL FANTASIA

24 NORBRECK ROAD, NORBRECK, BLACKPOOL, LANCASHIRE.
Tel: (0253) 591402



Renold Building, UMIST, Manchester
June 24 - 28
Stand No. 5





WHY

Speak low, talk slow, and don't say much..

To quote John Wayne

FOR the computing pioneers, computer memory was a major pre-occupation. The greatest advantage of a procedure or subroutine was that it enabled the same piece of code to be used more than once in the sense of being called from different parts of a program.

For example a five-second delay might be needed at different points in a game as shown in Figure I.

It was also appreciated that procedures have other advantages. They can be transported to other programs, they

**By ROY
ATHERTON**

help a programmer to retain control of a complex program during its design, coding and testing, and they help

others to understand it more easily.

In the 1980s the first reason is not so important and becoming even less so as memory technology advances.

On the other hand the value of clarity, control and portability have increased as the world of computing has grown. In my experience, which covers teaching and the writing of small and medium-sized programs, the value of procedures cannot be overstated.

One hallmark of a good programmer is the care with which a task is broken down, like a book is divided into chapters. The main program of, for example, a simple CAL (Computer Assisted Learning) program could include:

**PROCinitialise
PROCchoose
PROCplay
PROCscore**

This not only controls the com-

* Roy Atherton is with Bulmearshe Computer Education Centre.

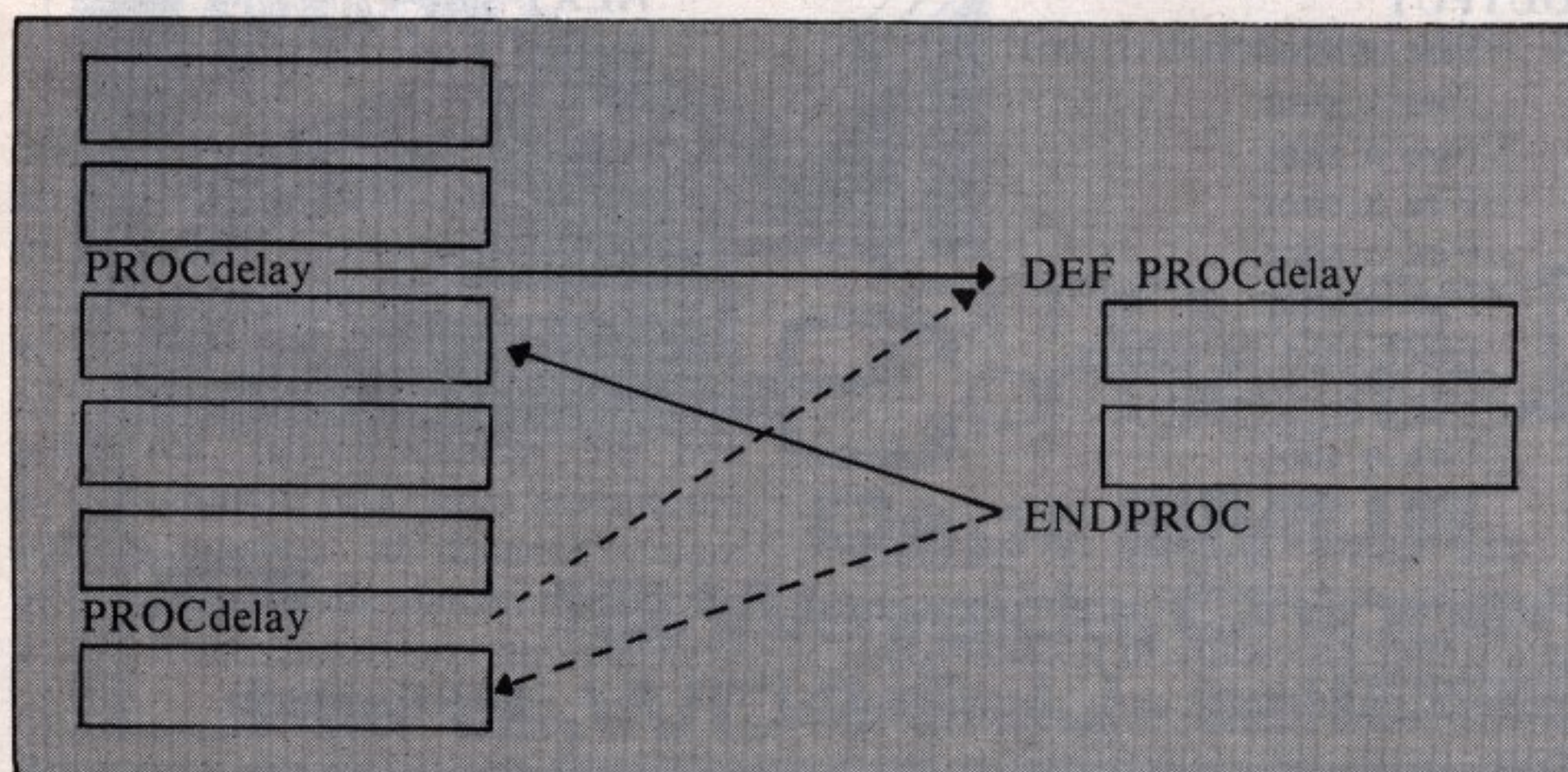
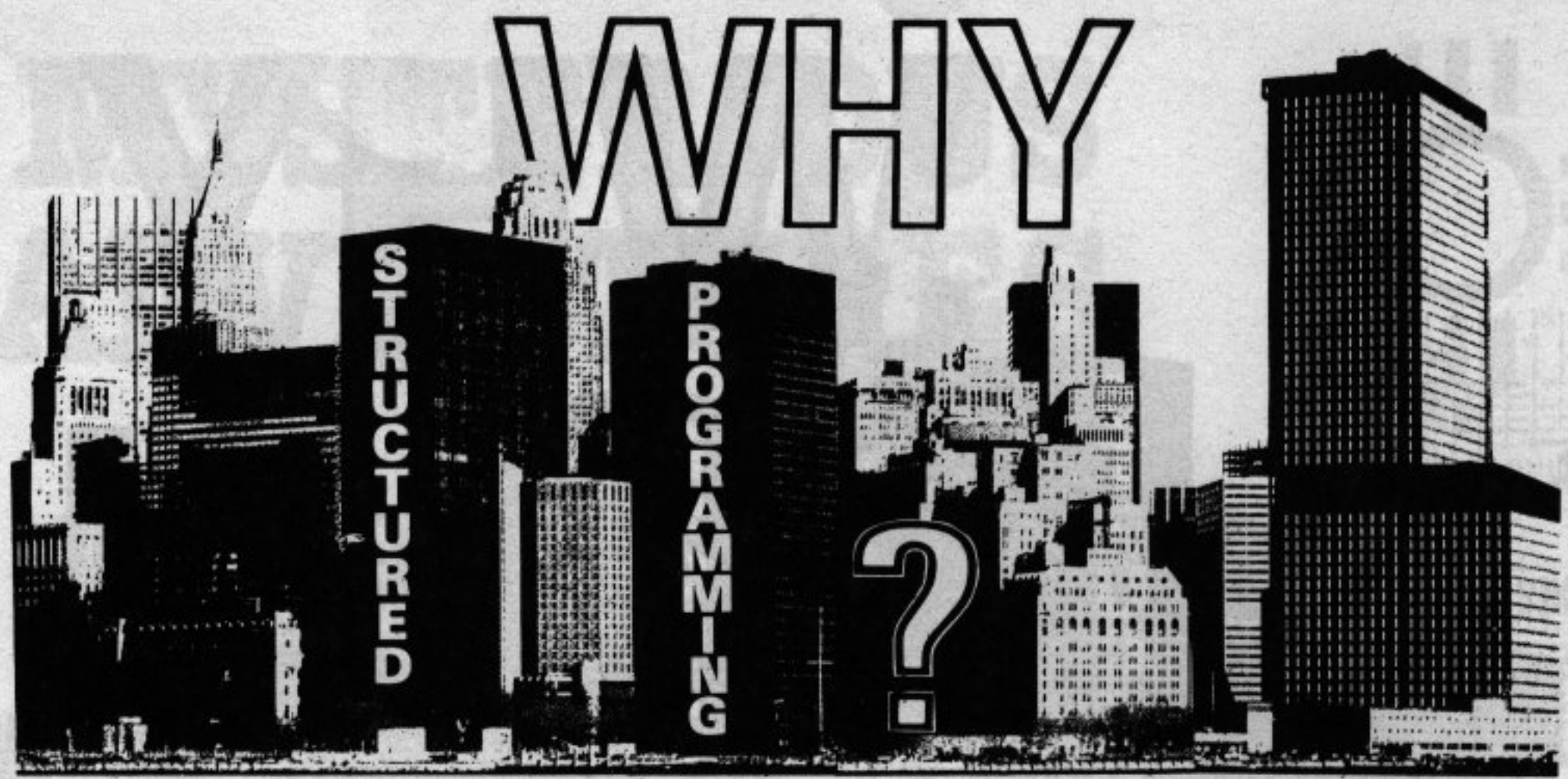


Figure I. A procedure for taking time



From Page 25

plexity of a job by breaking it into "mind-sized bites" but gives an overview of the whole with a list of well-chosen procedure names.

Quite simply, there is no better or easier way. The procedure definitions should appear roughly in order of their use:

```
DEF PROCinitialise
-
-
-
ENDPROC
DEF PROCchoose
-
-
-
ENDPROC
DEF PROCplay
-
-
-
ENDPROC
DEF PROCscore
-
-
-
ENDPROC
```

In BBC Basic procedures take on an extra importance. While the structures for handling repetition are reasonably good, the structures for handling the other major aspect of program control – decisions – are weak. The judicious use of procedures enables this weakness to be overcome without too much difficulty.

Remember the aim is to keep things simple. For this reason procedures are discussed before decision-making, though some might prefer such an order of treatment anyway.

A procedure should embody an idea. The idea may entail only a few lines of code – sometimes just one – or it may entail so much detail that it needs to be broken down still further. For example, Wyatt Earp's deputy might be firing shots at the bandit and he may need to reload.

We shall use a simple binary deci-

sion, though this is not discussed fully until the next article.

CONCEPTS: Procedure call and procedure definition.

The deputy should fire at the bandit until he throws his gun out. When necessary the deputy should reload. Ensure that the gunfight is likely to be prolonged by using a "20-sided die".

DESIGN

```
REPEAT
Fire a shot
IF gun empty THEN reload
UNTIL bandit throws out gun
END
DEF PROC reload
Eject empty cartridges
Insert new cartridges
ENDPROC
```

PROGRAM

```
shot = 0
REPEAT
gunout=RND(20)
PRINT "Fire a shot"
shot=shot+1
IF shot=6 THEN PROCreload
UNTIL gunout=20
PRINT "Bandit throws out gun"
END
DEF PROCreload
PRINT "Eject used cartridges"
PRINT "Load new bullets"
shot=0
ENDPROC
```

OUTPUT

```
Fire a shot
Fire a shot
Fire a shot
Fire a shot
Fire a shot
Fire a shot
Eject used cartridges
Load new bullets
Fire a shot
Fire a shot (etc.)
```

The above program is a simple illustration of the syntax and structure of a simple procedure. It is better to get the procedure habit early rather than wait until the complexities of a program make procedures essential.

The structure is shown below:

PROCEDURE CALL
PROCEDURE DEFINITION
OPENING KEYWORDS
PROCEDURE BODY
CLOSING KEYWORD

PROCreload

DEF PROCreload

PRINT "Eject used cartridges"

PRINT "Load new bullets"

ENDPROC

CONCEPT: Passing information to a procedure

Suppose that the deputy wished to vary his reload procedure depending on circumstances. The bandit may have been counting his shots and try to rush him while he reloads. It would be useful if the reload procedure could handle anything between one and six new bullets, thus allowing a faster process sometimes.

It is convenient to write:

PROCreload(2)

to insert two new bullets, or:

PROCreload(6)

for a full reload.

The procedure needs to be re-written using the variable, *number*, to determine how many are loaded:

```
DEF PROCreload(number)
FOR shell=1 TO number
PRINT "Eject used cartridge"
PRINT "Insert shell"
NEXT shell
shot=0
ENDPROC
```

The number specified in the procedure call would automatically become the value of the variable, *number*, in the procedure. The advantages of passing information this way are not all immediately obvious. The numbers 2,6 and the variable, *number*, are called parameters and are examples of a major concept in computing. The obvious immediate advantages are convenience and clarity.

PROCreload(2)

Software for the BBC Micro

...ROMS...

Available Soon!
SEND
FOR
DETAILS

Beeb-calc

A ROM based spread sheet program, like Wordwise this firmware is very fast and simple to use — yet is a powerful spread sheet analysis program, considerably better than the original 'calc' program — full floating point maths. Works in 80 or 40 column screen modes, variable column widths. Works with either cassette or disk.

This ROM coupled with Wordwise can turn your micro into an ideal small business machine.

£34.00 + VAT

Debugging Program

2 machine code programs — one in ROM, one on tape. Essential for the machine code programmer. An ideal compliment to the assembler built into the BBC machine. Contains a full machine code monitor allowing examination and alteration of memory, registers, setting of break points and even single stepping through machine code programs.

ROM based £19.00 + VAT

cassette £10.00 + VAT

Disk Doctor

A ROM containing useful disk utility programs. Enables the recovery of any data off the disk including deleted files etc. The full disk editor allows the alteration of any bytes directly on the disk (or in memory), or the loading and saving of any track or sector on the disk. Automatic transfer of programs from tape to disk and visa versa.

Includes a whole host of other useful utilities — string search, function key editing, the ability to format 35, 40 & 80 track disks.

£19.00 + VAT

Printer toolkit ROM

This includes routines for high resolution screen dumps for both the EPSON and NEC printers. Will work in any graphics mode with automatic grey shading of all screen colours. The most useful feature of this program is its 'spooling' capability, this enables data such as a program listings or high res screen dumps to be automatically spooled from your disk to the printer **while** using your BBC machine for running other programs.

£19.00 + VAT

Quantity discounts, starting at five off.

Wordwise

THE WORD PROCESSOR FOR THE BBC MICRO



Wordwise

The word processor for the BBC machine.

This ROM based word processor has received superb reviews.

A powerful and flexible system — it's greatest strength being that it is fast, simple and very easy to use. No other existing word processor (even ROM based, costing twice as much) can compare with the flexibility of this system.

Supplied with full spiral bound manual and cassette containing an example document and free typing tutor program.

£39.00 + £1.50 p&p + VAT

Now available from stock. Quantity discounts, starting at five off.

all ROM based software requires new series 1 Operating Systems. We are now in the position to supply 1.2 ROM's for £5.00 + VAT when you buy any of the above software.

CASH OR ROYALTIES waiting for any interesting software (not just games) for the BBC Micro. The better the program the more we will pay

Computer Concepts

Dept BMU6

16, Wayside, Chipperfield,

Herts, WD4 9JJ. tel(09277) 69727





GREAT BRITAIN LTD

"The opportunity to rule the country should not be missed – a must for all budding politicians."

Computer Answers, June 1983

"A complex and challenging game. An absorbing and thought-provoking game which exercises the mind rather than the fingers, yet without becoming dry and academic."

Which Micro, April 1983

"It is an excellent game, and it passed one crucial test, in that two economists of my acquaintance, although fully aware of its limitations, are still queing up to play it. You'd best buy it now before inflation pushes software up to £500 a tape."

Personal Computer News, April 1983

"At the end of five years you get to election day which is very true to life and tense – the game is very good and I enjoyed it."

Acorn User, December 1982

"The game has got great potential."

P.C.W., January 1983

Great Britain Ltd is available for the BBC Model B and comes on a cassette with full instructions.

Price £5.95 complete

Also available:

INHERITANCE (32K) **£5.95**

THE WORLD TRAVEL GAME (32K) **£6.95**

★ **Special Offer – All 3 games for £16.95** ★

SEE MAJOR REVIEWS OF GREAT BRITAIN LTD AND INHERITANCE IN
'MICRO USER' JUNE ISSUE, PAGES 66-67

**SIMON W. HESSEL SOFTWARE
(DEPT B)**

**15 Lytham Court, Cardwell Crescent, Sunninghill, Berks.
Telephone: Ascot 25179**

Supplier of software for ZX81 16K : SPECTRUM 48K : BBC 32K

24 HR DESPATCH

UNLIMITED GUARANTEE

From Page 26

is closer to saying in English
"Reload two shells"
than

```
number=2  
PROCreload
```

A further advantage is that the parameter, *number*, is treated by the computer as "local" to the procedure. This means that it cannot alter the value of a variable, *number*, used in the main program or in another procedure. The importance of this becomes greater as programs get longer or when procedures are transported to other programs.

It should be noted that the decision to allow reloading of fewer than six shells would imply a rethinking of the criterion for reloading. An alternative program is given, assuming the deputy starts with six bullets in his gun:

```
shots=6  
REPEAT  
gunout=RND(20)  
PRINT "Fire a shot"  
shots=shots-1  
IF shots=0 THEN
```

```
number=RND(6):  
PROCreload(number)  
UNTIL gunout=20  
PRINT "Bandit throws out gun"  
END  
DEF PROCreload(number)  
FOR shell=1 TO number  
PRINT "Eject used cartridge"  
PRINT "Insert shell"  
NEXT shell  
shots=number  
ENDPROC
```

After execution of the FOR loop in the procedure the new value of shots is the number of shells loaded. This information is passed back to the main program using an ordinary (global) variable, *shots*.

The reader may wonder why information is passed to the procedure with a parameter but back to the main program with an ordinary variable. The short answer is that the designers of BBC Basic were unable, or did not wish, to provide a parameter mechanism for the latter.

There is not a choice, but if there were, it might be argued that, in the early stages at least, the use of parameters in one direction and

ordinary variables in another is an easier learning approach.

SUMMARY

- Procedures should be sensibly named.
- The definition should have a single entry point (the opening keyword) and a single exit point (the closing keyword).
- Information can be passed to a procedure by using parameters.
- The main advantages of using procedures are that they enable the programmer to concentrate on "mind-sized bites", one at a time and keep an overview of the whole program.
- Other advantages are ease of reading and the avoidance of repeated code.

Perhaps the concluding observation should be that the program does not provide for anyone actually getting killed or so seriously wounded that the fight terminates.

John Wayne once gave advice about acting: "Speak low, talk slow and don't say much." This article is intended to be a low-key, easy-paced introduction using a program contrived as an illustration. To make it more realistic at this stage would be saying too much.

BBC MICRO COMPUTER CASES BY ANTLER.

Antler, the foremost name in British luggage announce the D618 - BBC micro computer case:-

- * High impact quality rigid ABS shells give excellent wearing characteristics and protection.
- * High density foam interiors with hard wearing black brush nylon.
- * Exclusive hardened aluminium box girder frame with radius corners for additional strength.
- * Steel toggle locks with lever action draw the frame tightly together. This with the tongue and groove frame protects against dust and moisture.
- * Double handles bolted through the frame provide a strong secure anchorage.
- * Cases carry after sales service and 2 years guarantee covering materials and faulty workmanship.

INTERIOR LAYOUT

Interior has profile cut foam to provide a firm grip to the computer, tape machine and 9 cassettes. Hand grip access slots for easy insertion and withdrawal of equipment. Foam protection beneath equipment.

Separate spacious compartment with rigid securing top for leads, 4 block 13A connector, extras - manuals, books or cassettes, plus others.

SPECIALIST CASES DIVISION
manufacturers a range of ABS cases -

VIZ: Toolcases, cases for samples and sales display, carrying disc packs, printed circuit boards and many others.



ANTLER THE BEST
OF BRITISH LUGGAGE.

Contact us

for your particular needs and further information.
Gordon Ashworth - Manager, Specialist Cases Division,
Antler Ltd, Bury, Lancs. BL9 9EF. Tel: 061-764 5241.

Name _____

Company _____



Address _____

antler
OF PALL MALL

Phone No. _____

MOST complaints received by Micro User from readers concern cassette loading and saving problems. We are continually being asked: "Which is the best recorder to buy?" Here's some timely advice from audio expert PETER ROCHFORD.

WHILE browsing around various computer shops that stock the BBC Micro, I have noticed that customers who arrive with their computer tucked under their arm proclaiming faults invariably have a cassette deck dangling from the other arm.

The conversation with the shop assistant that ensues normally follows the pattern of, "It won't load", "It won't save" or "Sometimes it loads", etc.

This observation leads me to the conclusion that despite the "Cassette Capers" articles in previous issues of *Micro User*, some of you are still struggling. Either that, or some owners of the Beeb are foolish enough not to be taking a copy of this excellent journal each month!

I have been using computers for about three years and have owned a UK101, a Commodore Pet and am now the very satisfied owner of the finest micro on the market — a BBC Model B.

With all these computers I have used the same cassette deck to load and save programs, namely a JVC 9201LSB radio cassette recorder which has a DIN record/playback socket and is equipped with remote motor control.

In the three years I have been using it I have never failed to load or save a program first time, nor has it ever devoured one of my precious programs or corrupted it. You can therefore understand my amazement at the problems people seem to have with cassettes.

It could be said that I am just lucky to have experienced no trouble but it is more likely because of my under-

standing of tape recorders, being an audio engineer by trade.

I intend in this article to reveal to you the secrets of my success and to give some details on choosing a cassette deck that should operate correctly and reliably with the BBC Micro.

You should also refer to the "Cassette Capers" articles in previous issues as there are important points there which I have not repeated here.

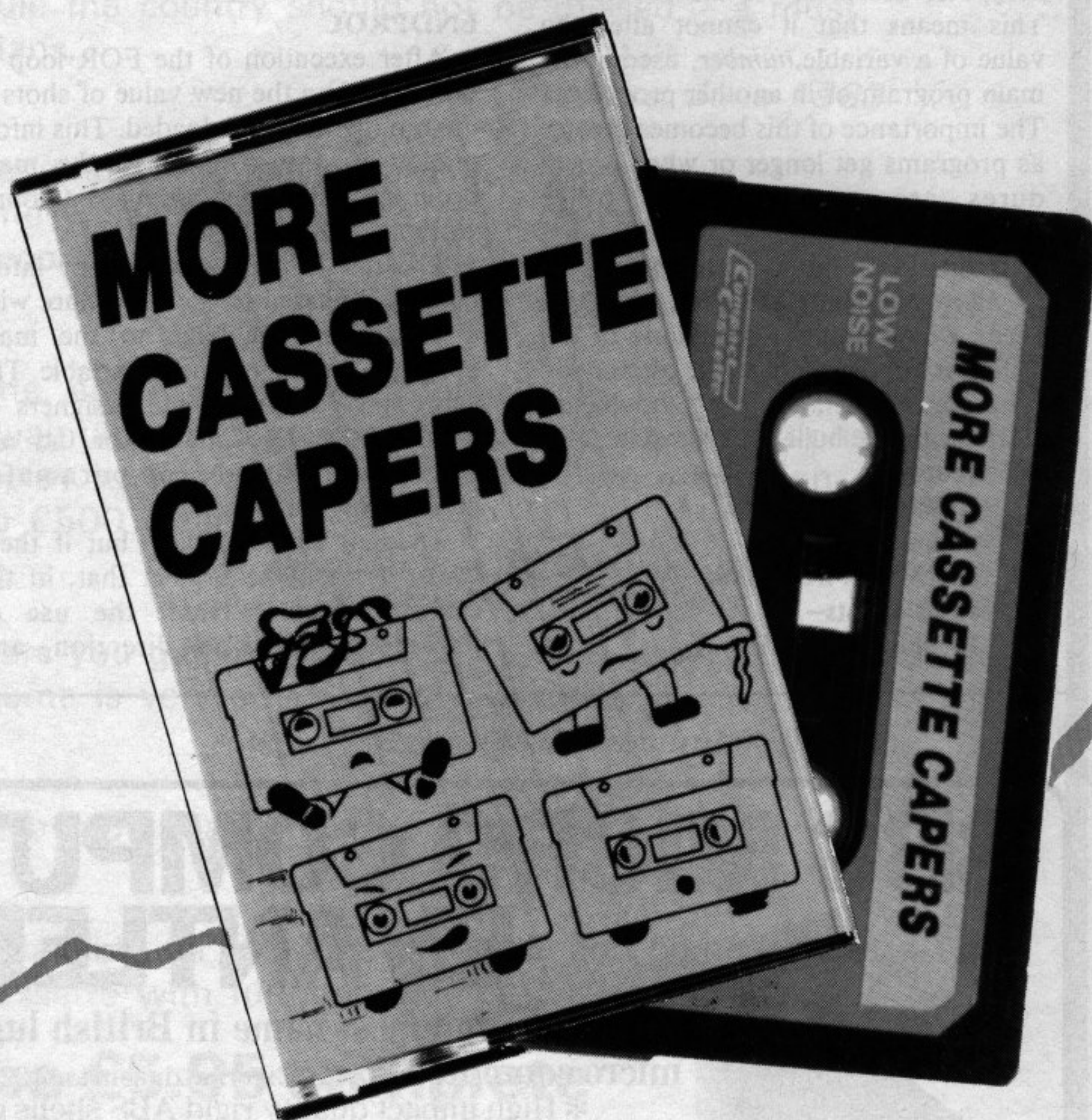
The question of tape deck compatibility with the BBC computer is a rather complex subject because there are so many factors to be taken into consideration. I have tried to keep things as simple as possible, and what follows should ensure that you will be successful in choosing the right

machine.

First, don't consider any machine which would mean using the output from the earpiece socket to load programs. The output impedance is wrong, the signal will contain too much noise and distortion and, most importantly, the output level will be high enough to blow the cassette interface in your computer.

Look for a unit which has a five-pin DIN socket and possibly remote motor control capability too. The types of connection are discussed quite adequately on pages 12 and 13 of the user manual.

What the user manual does fail to give, however, is the input/output levels and impedances for a tape deck to match the computer cassette interface



Loading problems?

correctly. They are given in the panel on this page.

You probably won't find a cassette deck that has figures that match these exactly but they should be as close as possible. With the output level you have quite a large margin to play with and should present little problem. An audio dealer of any worth should be able to advise you if you give him these figures.

When choosing a deck that fulfils the above specification, don't just go for the cheapest machine. The extra expense will be worth it as the signal quality will be better, the tape transport of higher quality (very important) and hopefully it should be more reliable with greater longevity.

It is quite in order to use a stereo machine such as one of the large radio cassette portables which are so popular these days. They should be switched into mono mode if possible when used with your computer so that both channels are connected together.

You should try to obtain a machine whose output at the DIN socket is independent of the volume control, that is, a fixed level corresponding to those given earlier. This means that you will not have to fiddle around getting the output right each time and you will also be able to turn off the ghastly row that emits from the loudspeaker during a load or save.

Those machines with manual recording levels instead of automatic are advantageous insofar as they permit you to check whether enough signal is being put onto the tape so you can adjust it accordingly. However, you may find on playback the level has dropped, which is a good indication that the tape you are using is of poor quality or that the heads are dirty. This leads me nicely on to the next topic.

Machine cleanliness (that is, the tape transport) is of paramount importance if your load or save will have any

chance of being successful. I clean the heads (record/playback and erase) along with the tape guides, rubber pinch roller and capstan once a fortnight. This is done by using cotton wool buds and head cleaning fluid, not those silly head cleaning tapes which are an ineffective and lazy way.

In addition, I use an electronic head demagnetiser every two months. This is the one manufactured by TDK and looks like an ordinary cassette. All you do is pop it into the cassette compartment and then press "play" for a few

Input impedance – *Greater than 150k ohms*

Output level – *20mv to 5v peak to peak (14v to 3.5v rms)*

Output impedance – *Less than 200 ohms*

Input level – *65mv peak to peak (46mv rms)*

seconds. They cost about £10 from better audio dealers and can obviously be used to good effect on your hi-fi system and your car player, too.

While we are on the subject of care of the tape transport it is important to mention remote motor control. It is now common to have this feature on cassette decks and it can cause problems without you realising it.

When under computer control via the remote switch, the motor on the deck is switched off automatically after a load or save. Unfortunately, on most decks, except the very expensive ones, this leaves the soft rubber pinch roller in contact with the metal capstan. The effect of this over protracted periods is to cause deformation of the rubber roller which will lead to uneven tape feed and irregular tape speed.

I never have them – and this is why

Furthermore, the tape is held between the roller and capstan causing a crease which can lead to signal dropout when you next use this section. The answer is: Don't leave the deck in play or record mode with the motor off for long periods.

When it comes to the cassettes themselves this is where I suspect the root of a great many people's problems lie. Quite simply, the majority of so called computer cassettes are just rubbish. The only ones I have found any good are the expensive ones marketed by a national chain at well over £1 each.

The alternative is to buy TDK DC45 tapes (no, I don't work for TDK!) which are 22 minutes a side and cost about 60p each from discount tape retailers. If you find these too long you can cut and splice them, as I do.

Laborious? Maybe – but reliable, definitely! If you doubt my words on this subject do two things. First, take one of the computer tapes you now use and gently pull a small length of tape from inside the cassette using a pencil. Note how thin the tape is, then look at the tape against the light. Odds are that the magnetic coating is so thin that you can see right through it. Compare that with a good quality audio tape.

Second, having carefully spooled the tape back inside the cassette, put it on your hi-fi system and record some music on it. The results should be enough to convince you when compared with good audio tape.

A tip to remember when saving a program on tape is always to wind the cassette forward past the transparent

Gemini

more progra

GEMINI SPECIAL FREE OFFERS

3 for the price of 2 – SAVE £19.95!
5 for the price of 3 – SAVE £39.90!
7 for the price of 4 – SAVE £59.85!
(CASHBOOK & FINAL ACCOUNTS NOT INCLUDED)



CASH BOOK ACCOUNTS PROGRAM FOR BBC 32K, TORCH, SPECTRUM 48K

NEW £59.95

One of the most innovative business programs on the market. Replaces a manual cash book system, e.g. Simplex and 'All-in-One'. Written by practising Chartered Accountants, this practical program is simple to use and will replace your manual cash and bank records. By giving you access to vital management information as and when you want it, it will enable you to keep more positive financial control of your business.

The software is extremely well and lucidly documented, and Gemini provide a full technical back-up and product up-date policy. Take a look at the information this program will provide:-

- * Summary of VAT information for VAT returns
- * Cumulative receipts and payments report analysed over the standard

profit and loss and balance sheet headings * Option for departmental analysis of sales and purchases * Audit trail printout of all transactions. * Journal routine for entering transfers between accounts and year end adjustment for debtors, creditors etc. * Trial balance at any interval * Interfaces to 'Final Accounts' program to produce balance sheet and trading and profit/loss account etc. * Spectrum version may be used with Sinclair OR 80 column printer.



FINAL ACCOUNTS PROGRAM FOR BBC 32K, TORCH, SPECTRUM 48K.....£59.95

Requires Cash Book module. This program will take your cash book data to the logical conclusion of balance sheet, trading and profit/loss account and notes to the accounts i.e. fixed assets, land and buildings and capital accounts. Final accounts (BBC version) links to 'Beebplot' for graphic data presentation.

Format: Torch disk, BBC disk/cassette, Spectrum cassette.

Special Offer – Cash Book and Final Accounts together – £95

J. B. SNODGREN & PARTNERS		J. B. SNODGREN & PARTNERS	
BALANCE SHEET AT 31/12/82		TRADING, PROFIT & LOSS ACCOUNT	
1982	1981	1982	1981
£	£	£	£
Fixed Assets	30000	Sales	40000
Current Assets	20000	Cost of Sales	25000
Less Current Liabilities	10000	Gross Profit	15000
Net Assets	20000	Operating Expenses	12000
		Operating Profit	3000
		Interest	500
		Net Profit	2500
		Dividends	1000
		Retained Profit	1500
		Net Profit	2500

"Gemini's range of software is in the vanguard of the releases for 'serious' micro users..."
(WHICH MICRO AND SOFTWARE REVIEW)



INVOICES AND STATEMENTS...£19.95

Compatible with most micros. See table. Ideal for the small business. A complete suite of programs together with generated customer file for producing crisp and efficient business invoices and monthly statements on your line printer. All calculations include VAT automatically, and the program allows your own messages on the form produced. This program gives you superb presentation and saves time on one of the most tedious tasks in the office.



COMMERCIAL ACCOUNTS...£19.95

Compatible with most micros. See table. A gem of a program, all for cassette, with the following features:- Daily Journal. Credit Sales. Cash Sales. Credit Purchases. Purchases—other. Sales Ledger. Purchase Ledger. Bank Account. Year to date summary. A fully interactive program suitable for all businesses. Files can be saved and loaded and totals from one file carried forward to another on cassette. Particularly useful from a cash flow point of view, with an immediate accessibility to totals for debtors and creditors. Bank totally supported with entries for cheque numbers, credits and, of course, running balance.



MAILING LIST...£19.95

Compatible with most micros. See table. A superb dedicated database to allow for manipulations of names and addresses and other data. Gemini's unique 'searchkey' system gives you a further ten 'user-defined parameters' to make your own selections. Features include the facility to find a name or detail when only part of the detail is known, it will print labels in a variety of user specified formats.



DATABASE...£19.95

Compatible with most micros. See table. The program that everyone needs, the most valuable and versatile in your collection. Facilities include sort search, list print if required. Can be used in place of any card index application; once purchased you can write your own dedicated database to suit your particular needs with a limitless number of entries on separate cassettes.



STOCK CONTROL...£19.95

Compatible with most micros. See table. Dedicated software with all that's necessary to keep control of stock. This program will take the tedium out of stock control and save time and money. Routines include stock set up, user reference number, minimum stock level, financial summary, line print records, quick stock summary, add stock, delete/change record and more.



HOME ACCOUNTS...£19.95

Compatible with most micros. See table. Runs a complete home finance package for you with every facility necessary for keeping a track of regular and other expenses, bank account, mortgage, H.P., etc. This program also allows you to plot graphically by Histograms your monthly outgoings.



WORD PROCESSOR...£19.95

Compatible with most micros. See table. This program features routines found in much larger and more expensive packages with a typical word length of 5-6 letters it allows for around 1000 words in memory at one time. Ideal for the user who requires a simple program to write letters on his computer. Features include, block delete, block insert, search and replace, edit text, display text and more.

"Simple to use"
"Ideally suited to the way most offices run....."
PERSONAL COMPUTER NEWS

ms for more computers!



SPREADSHEET ANALYSIS BEEBCALC £19.95 DRAGONCALC £19.95

NEW

FOR BBC AND DRAGON 32. Spreadsheet processors have proved to be important tools for using micros in business, scientific and domestic financial applications.

POSITION	A1	RC	SPACE	5185	T
1	II	A	II	B	II
2	-J.B. SNOOKER T/A POT-BLACK				C
3	PROJECTED CASH FLOW				II
4	YEAR				ENDED
5	Oct.				Nov.
6	£				£
7	INCOME				
8	Sales				
9					
10	REVENUE EXPENDITURE				
11	Purchases				
12	Advertising				
13	Director's salary				
14	Salaries				
15	Rent				
16	Telephone				
17	Insurance				
18	Printing, stationary				
19	Repairs & renewals				
20	Hire of equipment				
COMMAND BCDEFGPRSTW'?				60	60

Without any programming knowledge at all, you may:-

- Set up a computerised spreadsheet, with chosen row and column names.
- Specify formulae relating any row or column to any other.
- Enter your source data and have the results calculated.
- Save the results on tape (or disk—BBC) for later reloading and manipulation.
- Print the tabulated results in an elegant report format.
- Experienced users may access saved files and write their own reporting or graphics presentation programs for the results.

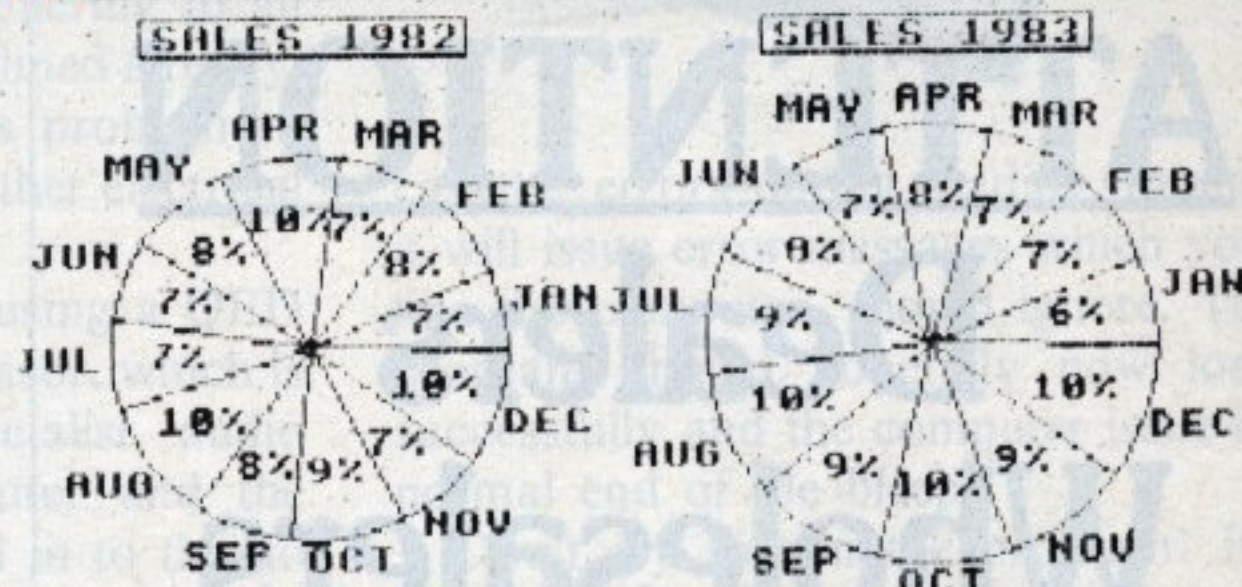
Some typical applications:-

- Small business accounting applications, e.g. profit and loss statements and cashflow projections, break-even analyses etc.
- Investment project appraisal—anything from double glazing to oil rigs!
- Comparing rent/lease/buy options.
- Processing the results of scientific experiments or field studies.
- Engineering calculation models.
- In fact, anything that involves repeated re-calculation of results presented in tabular or spreadsheet format.

Program Availability Chart:-

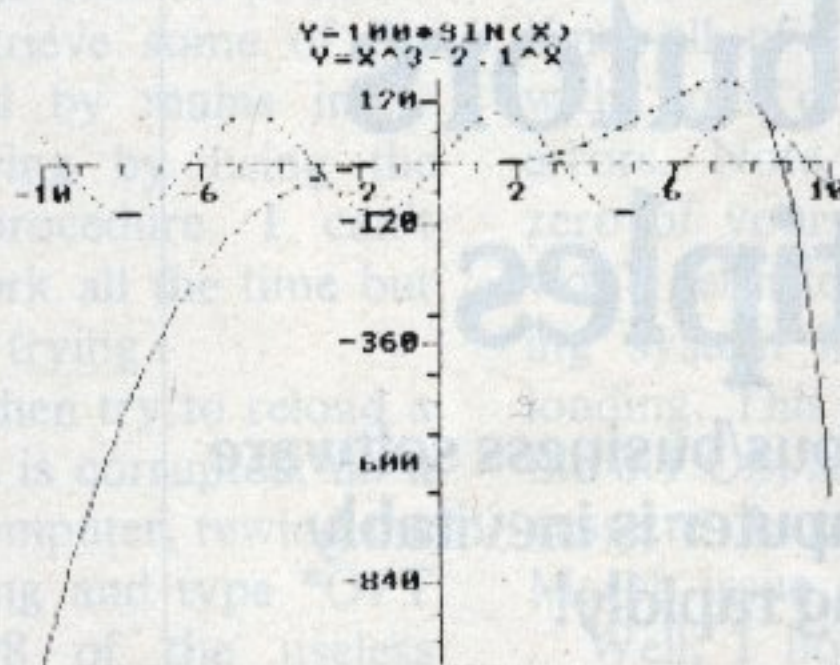
	Database	Stock Control	Mailist	Invoices & Statements	Spread sheet Analysis	Cashbook Accounting	Word processor	Home Accounts	Commercial Accounts	Plot	Final Accounts
Sinclair Spectrum 16k or 48k	●	●	●			●		●	●	●	●
Dragon 32k or 64k	●	●	●	●	●			●	●	●	
VIC 20 (16k +)	●	●	●	●				●	●		
Sinclair ZX81 (16k +)	●										
Grundig Newbrain	●		●								
Sharp MZ80A	●	●	●	●				●	●		
Sharp MZ80K	●	●	●	●				●	●		
Sharp MZ80B	●	●	●	●				●	●		
BBC Micro model A or B 32k	●	●	●	●	●	●	●	●	●	●	●
Atari 400/800	●										
Torch	●	●	●	●	●	●	●	●	●	●	●
Epson HX-20	●	●	●								
Commodore 64	●		●					●			

BEEBLOT & SPECTRUMLOT £19.95 NEW



100% = 60055

100% = 78085



Important new additions to the Gemini family. Present numeric and string data together in easily-understood pie chart, histogram or graph format. Beebplot has a built-in interface to Beebcalc, and both Beebplot and Spectrumplot have built in interfaces to the Final Accounts program of Cashbook. The facility for mathematical function

plotting is also provided. The BBC version has a high resolution screen dump for the Epson or CP-80 printers, and the Spectrum version dumps to the Sinclair printer via the 'copy' key. A very useful program that will give superb results either from direct input of data from the keyboard or via simple access to other software data files. A must for business and education.

Dealer/Trade enquiries invited – generous trade discounts for quantity.

Special ACCESS card instant sales hotline for prompt despatch... 24 hr Ansaphone Service.

All enquiries other than credit card sales to 03952-5832

Gemini. Functional Software Specialists. 9, Salterton Road, Exmouth, Devon. EX8 2BR

Tel: 03952 5165

PLEASE SEND URGENTLY

(Please note: Items as priced except BBC/TORCH DISKS: please add £4 extra for 40 track and £5 for 80 track format)

Name _____

Address _____

Machine Type _____ Memory Size _____

I enclose _____

Make cheques and postal orders payable to Gemini Marketing Ltd.

Access Number _____

Signature _____

"ACCESS ONLY" BY TELEPHONE

Gemini

MARKETING LIMITED

Gemini. Functional Software Specialists,
9 Salterton Road, Exmouth, Devon EX8 2BR

GEMINI

ATTENTION

Dealers Wholesalers Distributors Multiples

The demand for serious/business software for the microcomputer is inevitably increasing rapidly!

Take a look at our exciting range of quality software. Interested? Then talk to us about our advantageous terms and ask for our dealer pack, or a visit by one of our qualified sales staff.

For a full description of our product range see previous two pages.

ACT NOW!

FULL DEALER
LIST NEXT MONTH.

GEMINI

MARKETING LIMITED

Functional Software Specialists,
9 Salterton Road Exmouth Devon
EX8 2BR Tel: 03952 5832

EXTENDED COLOUR-FILL GRAPHICS
E.C.F.G. GIVES YOU A CHOICE OF

!! 4 BILLION + !!

SHADES FOR TRIANGLE FILLING
IN BBC MODES 0,1,2,4 & 5

- * PLOT 81 and 85 commands for triangle-filling have been adapted to use the ECFG fill-shade currently selected by new ECFG user-friendly commands. GCOL is still used for line colour.
- * Easy choice of 17, 289 & 6561 subset colours between those normally available in 2, 4 & 16 colour MODEs. Further options include colours, angles, spacings & widths of cross-hatch etc.
- * ECFG commands can be used in BASIC, typed from the keyboard, accessed in Assembler, or in future BBC Micro languages. ECFG is MOS-adaptive, and proven with versions 0.1 to 1.2
- * Bootstrap from cassette rapidly builds an ECFG module at a RAM address pre-defined by PAGE, which is then automatically increased 512 bytes to allow immediate LOADING of programs etc.

Price : £10 inc : Mail Order only

GAELSETT Software

44 EXETER CLOSE, STEVENAGE, HERTS. SG1 4PW.
(Tel. Stevenage 51224)

NEWARK VIDEO CENTRE
PRESENTS

SUPER CLEAR COMPUTER DISPLAY – AND A TV!!!

AN RGB MONITOR
WITH TV RECEPTION

- 14½" A2102/5/RGB £275.00
- 16" B3104/RGB £299.00
- 16" B3404/RGB £350.00 Remote Control
- 20" B6100/RGB £365.00
- 22" B7100/RGB £399.00
- 26" B8400/RGB £465.00 Remote Control

All prices include 12 month warranty, a 6 Pin
Din lead and carriage.

Grundig TV's & Grundig Approved Design
Educational and quantity discounts available.

For further details, Mon-Sat:-

**NEWARK VIDEO
CENTRE LTD.**

108 LONDON RD., BALDERTON,
NEWARK, NOTTS. NG24 3AQ.
TELEPHONE: 0636 71475

(See us on Stand 37 at the Micro Users Show)

From Page 31

leader by inserting a ballpoint pen in the take-up spool hub. This will ensure that your program is recorded on to the tape and not the leader! In addition, because there is a time delay during the save process before the computer starts sending data to the tape deck, the tape has further advanced past the initial section, which invariably has imperfections in it from the manufacturing process.

Contrary to popular belief your computer is more critical of your tape deck's performance for storing data than your ears are for its reproduction of music. This is hardly surprising when you consider the density of data being stored. At 1200 baud your recorder is loading or saving 120 characters per second on $1\frac{7}{8}$ inches of tape.

It doesn't take much to realise that the smallest imperfection in the tape, such as a crease or piece of missing oxide coating, will cause loss of information and subsequent loading problems. Likewise, variations in tape speed and tape feed will cause problems too. Cheap tapes are a false economy. If you want to be free from the dreaded "Bad Program", use good

quality audio tapes.

A friend of mine had the odd intermittent problem loading and saving with his Beeb, despite using a good quality deck and adhering to all the precautions I have outlined already. We eventually traced his problem to mains interference from other electrical equipment in the house.

This was resolved by using a QED mains interference suppressor, which is available from the specialist audio retailer. Both the computer and the cassette deck are plugged in to this to make it effective.

During our fight to cure his problem we managed to retrieve some of the programs corrupted by mains interference during saving by using the following simple procedure. I can't guarantee it will work all the time but it's certainly worth trying.

If you save and then try to reload a program and find it is corrupted, do a hard reset on the computer, rewind the tape to the beginning and type *OPT 2,0 (see page 398 of the useless manual, sorry, user manual) and then press Return. Then type LOAD (don't type CHAIN) followed by the filename, start the tape and press Return.

The computer will now ignore all



cassette errors during loading, though it will issue error messages which you, like the computer, should ignore. The program should hopefully now load successfully and the computer issue its normal end of file bleep.

Don't try to run the program! Instead, list it and you should find most of it intact. At least you will get some, if not all, of it back and can compare it with your original listing to correct errors. Note, however, that if block zero of your program is missing you won't get it to load at all as the operating system looks for this to initiate loading. This may happen if you have the 0.1 OS, in which case try using the cassette bugs fix published in the March issue of *Micro User*.

Well, I hope the ideas I have put forward will enable you to achieve the same success I have with cassette loading. There is no reason why not. Just pay particular attention to keeping your deck transport clean and use good tape.

What our Technical Editor says

WHILE I would heartily agree with most of what Peter Rochford has written, I must differ about his stated requirements for the input/output specifications of a tape recorder suitable for the BBC computer.

His specification will certainly work with the computer, but do not be misled into thinking that this is the minimum specification in respect of the BBC Micro.

From experiments I have carried out I have found that the BBC Micro requires the tape recorder to have input impedance greater than 10k with a sensitivity of 100 mV PTP and output impedance less than 1k with a signal of 2V PTP. It is plain that most domestic recorders will meet this spec., so why will some not work?

This can be for many reasons. For instance, the quality of the tape transport mechanism is quite low on the cheaper machines. This can cause tape grab as

the tape does not move smoothly through the machine.

Also the speed of the mechanism must be in theory $\pm 4.5\%$ of true speed. As this is the limit, look for a spec. of $\pm 2\%$ or better.

The frequency response of the recorder should be better than 2dbs at the two spot frequencies of 1200Hz and 2400Hz. This is a figure that is not normally known (even by the manufacturers), let alone quoted.

There is another point that can cause an otherwise excellent recorder to fail to work on a computer and that is the question of phase shift. There must be a minimum phase shift between the two frequencies (1200Hz and 2400Hz) that are used on the BBC Micro. If there is some shift, it will introduce distortions into the signal which can cause it not to work.

As the human ear cannot detect the phase in a sound this is something that

is often ignored in the design and is just left to chance. This is quite difficult to measure on a tape recorder and you will have to test it by seeing if it works on your computer.

Perhaps this explains why seemingly identical recorders will give differing results.

This should not happen with a recorder that has been especially designed for recording computer data.

Finally I would like to disagree with Mr Rochford's comments on the desirability of a fixed volume level out of the DIN socket. In some recorders this is not sufficiently strong to operate the BBC Micro.

However, assuming that it is, there would also be no way to compensate for a tape recorded at a lower saturation, or a slightly different head alignment. This can happen when you are playing a tape not recorded on your own machine.

Mike Cook

BBC MICRO ^{IN} MANCHESTER

**YES, WE'VE PROBABLY GOT IT IN STOCK –
NOW WHAT WAS IT YOU WANTED?**

COMPUTERS

BBC Micro Model B £399 incl.
BBC Micro Model B with DFS £469 incl.

DISC DRIVES

TEAC Slimline 100K single sided £205 incl.
200K and 400K also available.
LVL 100K £265 incl.
Disc Interface Kit £95 + VAT

PRINTERS

AP100A £237 incl.
Olivetti Spark Jet £365 + VAT
Star Dot Matrix Printer DP510
100 cps : 9 x 9 matrix : TRUE descenders : Friction +
Tractor feed : Hi-Res dumps : block graphics : Subscripts
and Superscripts : Italics : Auto-underlining : Vertical +
Horizontal TAB : left and right margin : backspace :
International characters – AMAZING PRICE OF £349 +
VAT.

MONITORS

Sanyo Green Screen £99 incl.
Microvitec RGB Colour £249 + VAT

SOFTWARE

We always have a massive selection of games
software in stock.



DISC BASED SOFTWARE

for BBC Model B with 100K Disc Drive or above (Monitor + Printer optional)

**RING FOR AVAILABILITY
DIRECT AND THROUGH
DEALERS**

INTERACT – Integrated Accounts

Keep tabs on 800-1200 invoices per 100K disc drive. Invoice entry, search, sort, and Account management plus credit management and alert are handled from a series of menus. When searching for an invoice or set of invoices you may enter a keyword such as the clients name or you can look for other details such as a nominal sale code.

Please note this is the real thing and fulfills the dream of every small businessman who wanted to put his accounts on his BBC computer, just like they seemed to say you could on the TV!

This program will be available from your local dealer in the future and should now be available from us. We guarantee the disc for six months but there is a back-up facility. One final thing we should mention is that our Commercial Accounts program handles VAT at differing rates unlike some other amateurish versions on the market.

Manual £5.00 – Program + Manual £99.95 incl. VAT.

BSTOCK – Stock Control

Keeps stock control on 800-1200 stock items per

100K disc.

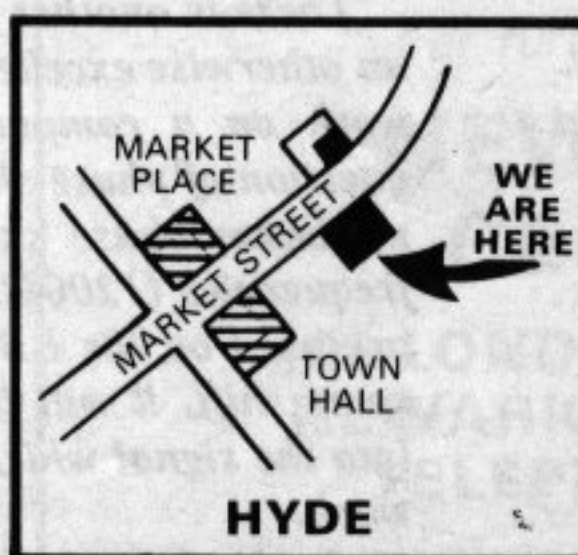
There is an entry system, update, auto re-order and search + sort facilities.

All files are randomly accessed and searched for automatically from disc.

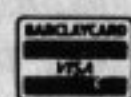
Manual £5.00 – Program + Manual £49.95 incl. VAT.

COPYRIGHT NOTE – These programs are sold only for the use of the person or Limited Company who purchased them. If found in any unauthorised hands their supplier will be liable for substantial damages.

C ★ TECH COMPUTERS



**184 Market Street,
Hyde,
Cheshire SK14 1EX.
Tel: 061-366 8223**



EDUCATIONAL & BULK
DISCOUNTS AVAILABLE

Midwich

COMPUTER COMPANY LIMITED

1st choice for **BBC** microcomputers

BBC COMPUTERS

Model B £346.95
Model B + Disc Interface £441.95
Please phone to check delivery

BBC MICRO DISC DRIVES

BBC 31 Single 100K Drive £199.00
Expandable to 2 x 100K
BBC 32 Dual 100K Drives £330.00
BBC 33 100K Upgrade for BBC 31 £140.00
BBC 34 Dual 400K Drives £575.00
BBC 35 Utilities Disc (supplied only with BBC 31,32, 34) £25.00

All Drives except BBC 33 supplied cased with Connecting Leads.

PRINTERS

NEC 8023 Printer £320.00
(Carriage £10)

NEW

Shugart Single 100K Disc Drive
(Fully compatible with BBC Micro)
£199 + VAT
Carriage £5 + VAT

Utilities Disc with Word Processor
£25 + VAT

Supplied complete with all Connecting Cables

Expansion slot for second Drive
£140 + VAT

Fast ex-stock delivery by Securicor...
All prices exclude VAT.

BBC UPGRADE KITS

BBCA2B Complete A to B Upgrade £44.75
BBC 1 16K Memory £18.00
BBC 2 Printer/User I/O Kit £ 7.50
BBC 3 Disc Interface Kit £95.00
only supplied with Disc Drives
BBC 4 Analogue Input Kit £ 6.70
BBC 5 Serial I/O RGB Kit £ 7.30
BBC 6 Bus. Expansion Kit £ 6.45

All kits are supplied with full fitting instructions.

BBC CONNECTORS

BBC 21 Printer Cable and Amphenol Plug (not assembled) £13.00
BBC 22 User Port Connector and Cable 36" £ 2.46
BBC 23 Cassette Lead £ 3.50
BBC 24 7 Pin Din Plug £ 0.60
BBC 25 6 Pin Din Plug £ 0.60
BBC 26 5 Pin Din Plug £ 0.60
BBC 35 Disc I/O Cable 34W IDC to 2 x 34 way Card Edge £12.00
BBC 36 Disc Power Cable £ 6.00
BBC 44 Analogue Input Plug & Lever £ 2.25
BBC 66 1 M Bus Connector + 36" Cable £ 3.50

BBC ACCESSORIES

BBC 45 Joysticks (per pair) £11.30
BBC 67 Eprom Programmer (assembled) £57.95

ACORN SOFTWARE FOR THE BBC

SBE03 Business Games £ 8.65
SBE04 Tree of Knowledge £ 8.65
SBE02 Peeko Computer Inc Manual £ 8.65
SBE01 Algebraic Manipulation PK £ 8.65
SBX01 Creative Graphics Cassette £ 8.65
SBX02 Graphs & Charts Cassette £ 8.65
SBB01 Desk Diary Inc Manual £ 8.65
SBL02 Lisp Cassette £14.65
SBL01 Forth Cassette £14.65
SBG01 Philosophers Quest £ 8.65
SBG07 Sphinx Adventure £ 8.65
SBG03 Monsters £ 8.65
SBG04 Snapper £ 8.65
SBG15 Planetoid £ 8.65
SBG06 Arcade Action £10.35
SBG05 Rocket Raid £ 8.65
SBG13 Meteors £ 8.65
SBG14 Arcadians £ 8.65
SBG10 Chess £ 8.65

ACORN SOFTWARE BOOKS FOR THE BBC MICRO

SBD01 Creative Graphics £ 7.50
SBD02 Graphs - Charts £ 7.50
SBD04 Lisp £ 7.50
SBD03 Forth £ 7.50

* Please ring for current delivery on Acornsoft products before ordering.

BBC MICRO COMPONENTS

4516 100NS £ 2.25
6522 £ 3.19
74LS244 £ 0.59
74LS245 £ 0.69
74LS163 £ 0.34
DS3691N £ 4.50
DS88LS120N £ 4.50
UPD7002 £ 4.50
8271 £36.00
20 Way Header £ 1.46
26 Way Header £ 1.76
34 Way Header £ 2.06
40 Way Header £ 2.32
15 Way D Skt £ 2.15
6 Way Din Skt £ 0.90
5 Way Din Skt £ 0.90

BBC SOFTWARE IN ROM.

Wordprocessor "View" £52.00
1.2 MOS £10.00

12 month "no quibble" warranty on all products

Fitting Service available

...from East Anglias leading supplier

Delivery charges
Computers/Disc Drives £7.50
Components/Software £0.50
Books/Joysticks £1.00

MIDWICH COMPUTER COMPANY LIMITED

RICKINGHALL HOUSE, RICKINGHALL, SUFFOLK IP22 1HH
TELEPHONE (0379) DISS 898751



W

O

R

D

W

I

S

E

WORDWISE is a word processing program on a chip. It can be fitted into the rightmost ROM socket in which case you will go into Wordwise on switching on, or into the socket to the left of the Basic ROM, in which case you enter Basic as usual.

When in use it will take up the 16k allocated to Basic, which has the advantage of leaving the user 32k (less display memory – 1k in teletext mode – and the 3.5k used by the MOS) for text storage.

It will only run with OS1.0 or higher and though it will run on a model A there will be a lot less space for the text, which will have to be transferred on tape to a model B for printing.

The program operates in two modes, menu mode (on switching on) and edit mode.

To get into Wordwise after switching on the machine you type “*W.”. The program title comes up on the screen and you are asked if memory contains old text.

On switching on, or using Wordwise for the first time since switching on, the answer must be “No”, but it is possible to go into Basic (using *BASIC) and execute statements in immediate mode without disturbing memory.

The menu contains eight items which allow you to save old text, load new text, do a global or selective search and replace, or to review, print or spool the text in memory.

There are two forms of saving text. One allows you to save only a marked portion, the other saving all the text.

Similarly, there are two forms of loading text, one replacing the contents of memory with the loaded text, the other inserting the new text at the cursor.

Search and replace will either replace every occurrence of a given string with another or, in the selective mode, will stop at every occurrence of the string and give you the option of replacing it, leaving it unchanged or (by pressing Return) of deleting it.

If you just want to find all occurrences of a particular string, you can use the selective replace with a null replacement string and press “N” every time.

The other menu items output the text in its formatted state. This may be to the printer – normally through the Centronics interface but this can be easily changed to the RS423 interface – to the filing system (Wordwise can be used with both cassette and disc filing systems) or to the screen.

Sending it to the filing system allows documents to be sent to people who do not have Wordwise.

Text sent to the screen can be previewed in its formatted state. If there is enough room then an 80 column display will be used, otherwise it will be displayed in 40 columns.

To send output to the RS423 in-

THE MENU

1. Save entire text.
2. Load new text.
3. Save marked text.
4. Load text to cursor.
5. Search and Replace.
6. Print text.
7. Preview text.
8. Spool text.

terface the command *FX5,2 is used in menu mode. Since the program can communicate with a printer over both a Centronics and an RS423 link, there should be little difficulty in connecting it.

Pressing the Escape key will go from menu mode to edit mode or vice versa. Using the Escape key while in one of the menu operations will abort it and return you to the menu.

While in menu mode, any MOS command such as *CAT or a *FX command can be given. Wordwise is left by typing *BASIC in menu mode.

Edit mode is the one you actually write your text in. The cursor keys are used to move around the screen, and one disconcerting thing is that the cursor line remains in the middle of the screen while the lines move up or down around it. However this does mean that the 12 lines before and after the cursor line are always in view.

The cursor keys will move one character to the left or the right, or one line up or down. Pressing CTRL together with a cursor key will jump one word to left or right or 23 lines (one page) up or down.

Pressing Shift and a cursor key will move the cursor as far as it will go in that direction – to the beginning or end of the line, or to the beginning or end of the text – very neat and logical.

When typing in the text no Returns are necessary as a word which goes over the end of a line is (instantly) transferred to the beginning of the next line. If a Return is typed then a line break occurs and the words on the next line will not be used to fill the previous line. By this simple means paragraphs

CHRIS MARTIN reviews the word processing program that comes to you packed in a chip

and blank lines may be inserted into the text.

As lines are typed in, a status line at the top of the screen shows how many words the text contains as well as the number of characters remaining in memory.

In Edit mode Wordwise uses the function keys to provide a set of very useful editing commands. They also allow one to start and end embedded commands.

FUNCTION KEYS

- f0 Swap between Insert and Overwrite mode
- f1 Start formatting command
- f2 End formatting command
- f3 Set marker (up to 2 can be set)
- f4 Move to a given character
- f5 Count words to a given character
- f6 Delete to a given character
- f7 Delete text between markers
- f8 Move marked text, inserting it at the cursor
- f9 Copy marked text, inserting it at the cursor

Key 0 is used to change from Insert to Overwrite mode. On entry, the program is in Insert mode – all text entered pushes any text after it to the right to make room. In Overwrite mode

the text remains where it is and the new characters overwrite the text already there.

Key 3 allows two markers to be set.

Command	Range	Default	Formatting commands
LMn	0 to 180	5	Set left margin
LLn	10 to 200	70	Set line length
INn	0 to LL-10	0	Set indent
TIn	0 to LL-10	0	Set temporary indent
CI	--	--	Cancel indent
FLn	10 to 200	66	Set number of lines per page
TSn	0 to 50	7	Set top margin
DH <text>	--	--	Define heading as <text>
HPn	0 to TS	3	Set heading position in top margin
BSn	0 to 50	7	Set bottom margin
DF <text>	--	--	Define footing
FPn	0 to BS	3	Set footing position in bottom margin
JD	--	ON	Justify text
NJ	--	OFF	No justification
LSn	1 to 50	1	Set line spacing (LS1 is single spacing)
SS	--	ON	Set single spacing
CEn	1 to 200	1	Center the next n lines
OCn, n}	0 to 255	--	Output control codes – as many codes can be sent as required
SPn	0 to 200	0	Leave n blank lines
CO	--	ON	Print text with no pages, headers, footers &c
EP	--	OFF	Print text with pages, headers, &c
BP	--	--	Start a new page
PNn	1 to 1999	1	Set page number
CFn	0 to FL	--	Start a new page unless at least n lines remain
DPn	0 to 255	96	Send code n for pound sign
PCc	! to z	ñ	Set pad character
DTn, n	0 to 200	10, 20, ...	Define tab stops (up to 9)
EM	--	OFF	Give "PAPER!" message at end of page
DM	--	ON	No "PAPER!" message
PP	1 to 9999	PN	Print page number
GF "filename"	--	--	Get file & dump it to printer

From Page 39

Text between them may be saved, printed, moved, copied or deleted.

Saving and printing are done by returning to Menu mode after setting the markers. Moving, copying and deleting are done using keys 7, 8 and 9 in Edit mode.

Move deletes the passage between the markers while inserting it at the cursor. Copy inserts the marked passage in the same way but doesn't delete it.

There are three other key functions:

Move To moves the cursor to the next occurrence of the character entered in response to the resulting query.

Word Count allows the count of words to be made for parts of the text only.

Delete To will delete text from the cursor position to the next occurrence of a given character.

One nice editing feature is CTRL-S, which will swap the case of the letter under the cursor from lower to upper case or the other way round. I like this – but then I have a predilection for CASE chanGES.

Formatting commands are entered by pressing f1 and ended by pressing f2. Multiple commands can be entered in an abbreviated mode where the f1 key for the following command acts as the f2 key for the previous one.

There are commands to set the left margin and the line length, the page length and the margins at the top and bottom of the page.

Headers and footers can be defined and these can include formatting commands in the string, though only a few commands like the "Print page number" command make any sense.

Indents can be set and, to allow the first line of a paragraph to be indented, a temporary indent which applies to the next line only can be defined.

Text may be justified – extra spaces are inserted in a line so that the right margin as well as the left is aligned – or not justified, with a ragged right margin.

Line spacing can be set to any number or single spaced, and lines can be centred.

There is a command to leave a variable number of lines blank which is useful if diagrams or tables are to be inserted later. There is another to force a new page if there are less than a given number of lines left on the current page.

This can be used to make sure that chapters, lists or paragraphs are not split awkwardly between pages.

A related command allows a file to be read in at any point in the text and dumped straight out to the printer – this might be a program listing or a piece of program output.

Another command (initially active) causes the printout to be made without headers, footers or page numbers as a rough draft mode. When it has been licked into shape, page mode can be enabled and the full formatting appreciated.

There are no commands to activate printer functions like underlining, super- or subscripting, double or condensed printing but the OC (output control codes) command will send an arbitrary string of characters – entered as decimal numbers – to the printer.

There is also a special command to define the code to be sent to the printer for a "£" character.

The BBC Micro sends code 96 for this character but the Epson printers (in the English character set) and Diablos print a "£" for code 35. The simple command DP35 will ensure that your pounds don't become devalued!

There is provision for a pad character (initially ";") but this can be changed by another formatting command) which can be used to make sure that when text is justified extra spaces are not inserted where they are unwanted. The character appears in the text as ";" but is printed as a space.

Finally, it is possible to get the program to stop at the end of a page, bleep and display "PAPER!" so that if single sheets are being used, there is time to put in the next sheet.

There are a number of other commands which you will find in the table on Page 39, but it is primarily the commands that I have discussed that will enable the reader to decide whether Wordwise is what he is looking for.

The manual also contains a section on hints and tips. Among other things this shows how Basic programs may be edited using Wordwise – this is both possible and easy.

The final section of the manual contains some technical details about the program and a list of all the formatting commands and the operations performed by the function and cursor keys.

The chip arrived with an example on cassette, a 30 page manual, a sheet containing the installation procedure and a function key label strip to slide under the plastic strip above the keys.

Installing the chip is easy if you have some experience. Previously I had none, and I managed to bend some of the legs. Thinking that any minute they would drop off and I would be left with



£45 of useless chip, I was sweating.

However a more experienced colleague came to my aid and coolly straightened the bent legs, aligned both sides with the holder and in it went with no further trouble.

Anybody without experience who is determined to insert their own chip would be well advised to read the article by Mike Cook in the March issue of *Micro User*.

Using Wordwise is made easier if you have a colour monitor, as the status line and the formatting code appear in colour. On a monochrome monitor they would appear as shades of grey which would be easy to overlook (Inland Revenue please note!).

The manual is well laid out and well printed, though it seems rather difficult to find the command you want. The list of commands in the back is printed in the order they appear in the text. It would perhaps have been better if they had been in alphabetical order.

Wordwise is easy to get started with since the text is neatly formatted with no need for special commands, just typing it in with Returns to separate paragraphs.

Once this has been done you can start setting up headers and footers, centering headings and so on.

It seems a very good program and worth the money.

IF OUR ADVERT DOES NOT CONVINCE YOU THE FREE PRINTOUT SAMPLE WILL.

SHINWA-CTI CP80

FULL FEATURED 80 COLUMN MATRIX PRINTER

PROBABLY THE BEST PRINTER AVAILABLE IN THE WORLD
BELOW £300!!

COMPATIBLE CENTRONICS INTERFACE
AND INDUSTRY STANDARD CONTROL
CODES MAKES THE CP 80
IDEAL FOR:-

BBC, DRAGON, ORIC,
APPLE, NEWBRAIN,
SIRIUS and many more.

OPTIONAL RS232
INTERFACES AVAILABLE
BOTH UNBUFFERED
AND BUFFERED

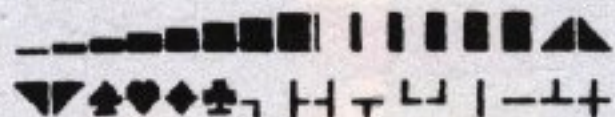


Made in Japan

FULL ONE YEAR WARRANTY

SPECIFICATIONS

- | | |
|--|--------------------------------|
| + 80 COLUMN | + <u>AUTO UNDERLINING</u> |
| + FRICTION AND ADJUSTABLE TRACTOR FEED | + VERTICAL AND HORIZONTAL TABS |
| + BIDIRECTIONAL LOGIC SEEKING | + BACKSPACE |
| + HI-RES GRAPHICS AND BLOCK GRAPHICS | + SELF TEST |
| + SUB AND SUPERSCRIPTS | + ITALIC PRINT STYLE |
| + 9 X 9 DOT MATRIX - TRUE DESCENDERS | + EXPANDED ASCII |
| + CONDENSED PRINT | + DOUBLE PRINT |
| + EMPHASISED PRINT | + £ AND # SYMBOLS |
| + GRAPHICS SET - | |



@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
!"#\$%&'()*+,-./0123456789:;<=>? !"#\$%&'()*+,-./012

NO DELAY! - TELEPHONE YOUR CREDIT CARD No. TODAY
AND YOU CAN START PRINTING TOMORROW

- AND IF YOUR NOT SATISFIED RETURN WITHIN 14 DAYS
FOR A FULL REFUND.



HAMPTON COURT  KEY WALTON

OPEN 6 DAYS A WEEK
MON - SAT 9am to 7pm (6pm SAT)



PRICES QUOTED EX VAT AT 15%
H.P. FACILITIES ARRANGED
CAN BE DELIVERED WITHIN
24 HOURS FROM STOCK



COMPUTER CENTRES LTD

Enterprise House 44 Terrace Road,
Walton-on-Thames, Surrey KT12 2SD

Telephone: Walton-on-Thames

(09322) 42777

(4 lines)

TO KEY COMPUTER CENTRES LTD

Please send me FREE print out samples
and literature.

Name

Address

Post Code.....

STRIKE LUCKY

By ANDREW PHILIPS

TENPINS is a simulation of the game of tenpin bowling. It uses Mode 7 graphics to ensure that the program can run on both models A and B.

The program is quite straightforward. The list of procedures should explain what's going on clearly enough to allow you to make your own modifications.

The game follows the normal rules of play, and incorporates the standard method of scoring.

It consists of ten FRAMES, each player bowling two balls in a

frame (unless the first bowl is a strike).

If a player scores a STRIKE (all 10 pins down with the first bowl) a bonus of the next two balls is added to his score.

A SPARE (10 pins down with two bowls) gives a one-ball bonus.

A strike in the final (10th) frame gives a player two bonus balls (EXTRAS).

A spare gives one EXTRA.

To bowl a ball, a player must make three entries, as follows:

POSITION (0 to 9) ?

Enter the starting position of the

ball. 0 is the left of the lane, 9 is the right.

SPEED (0 to 5) ?

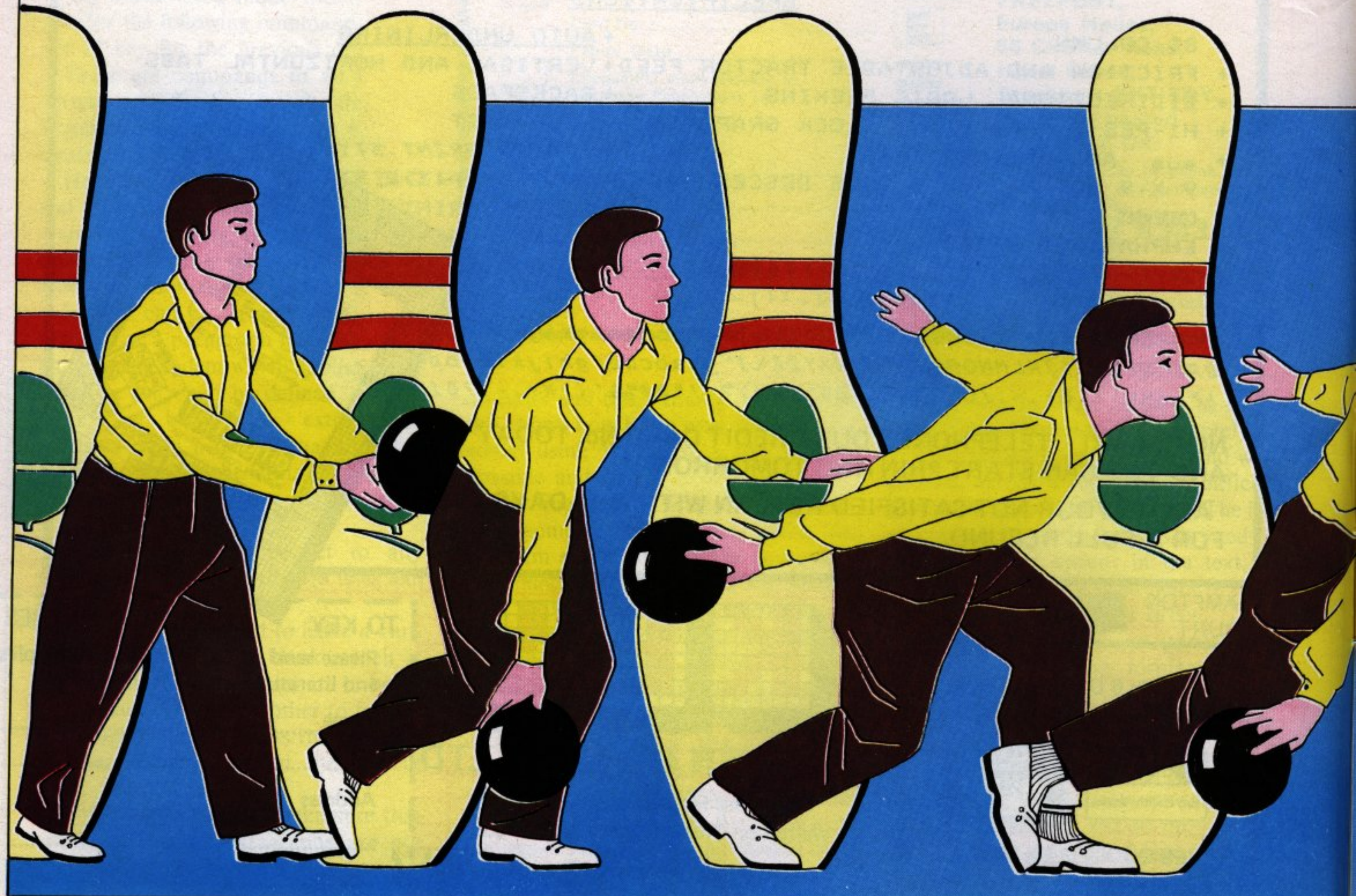
Enter the speed of the bowl. 0 is slowest, 5 is fastest.

BIAS (L or R) ?

Enter the direction in which the ball is to "swerve" – left or right.

The amount of "bias" is inversely proportional to the speed of the bowl. The slower the bowl, the greater the "swerve".

To make the game more interesting, the exact degree of bias is unpredictable.

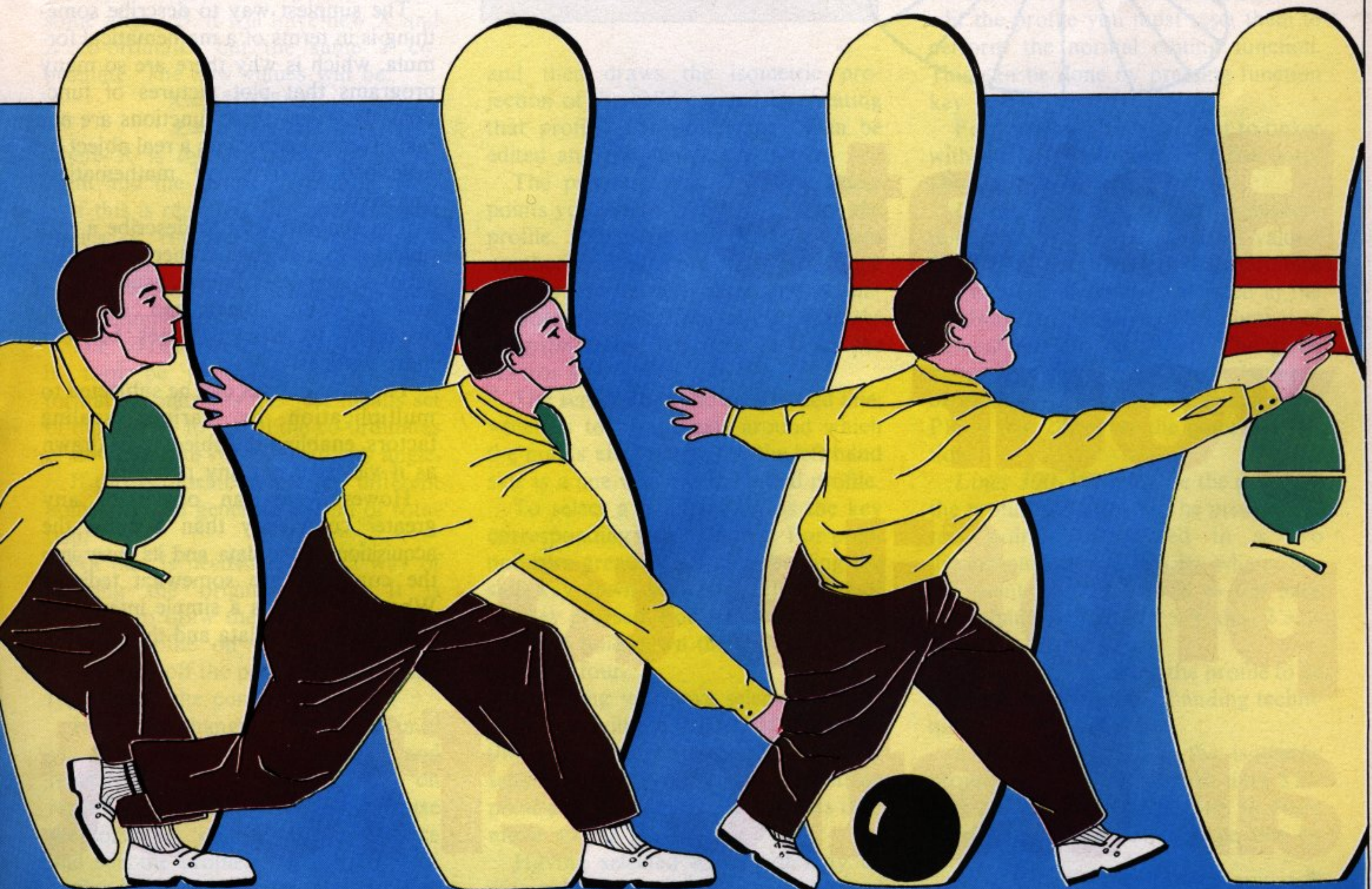


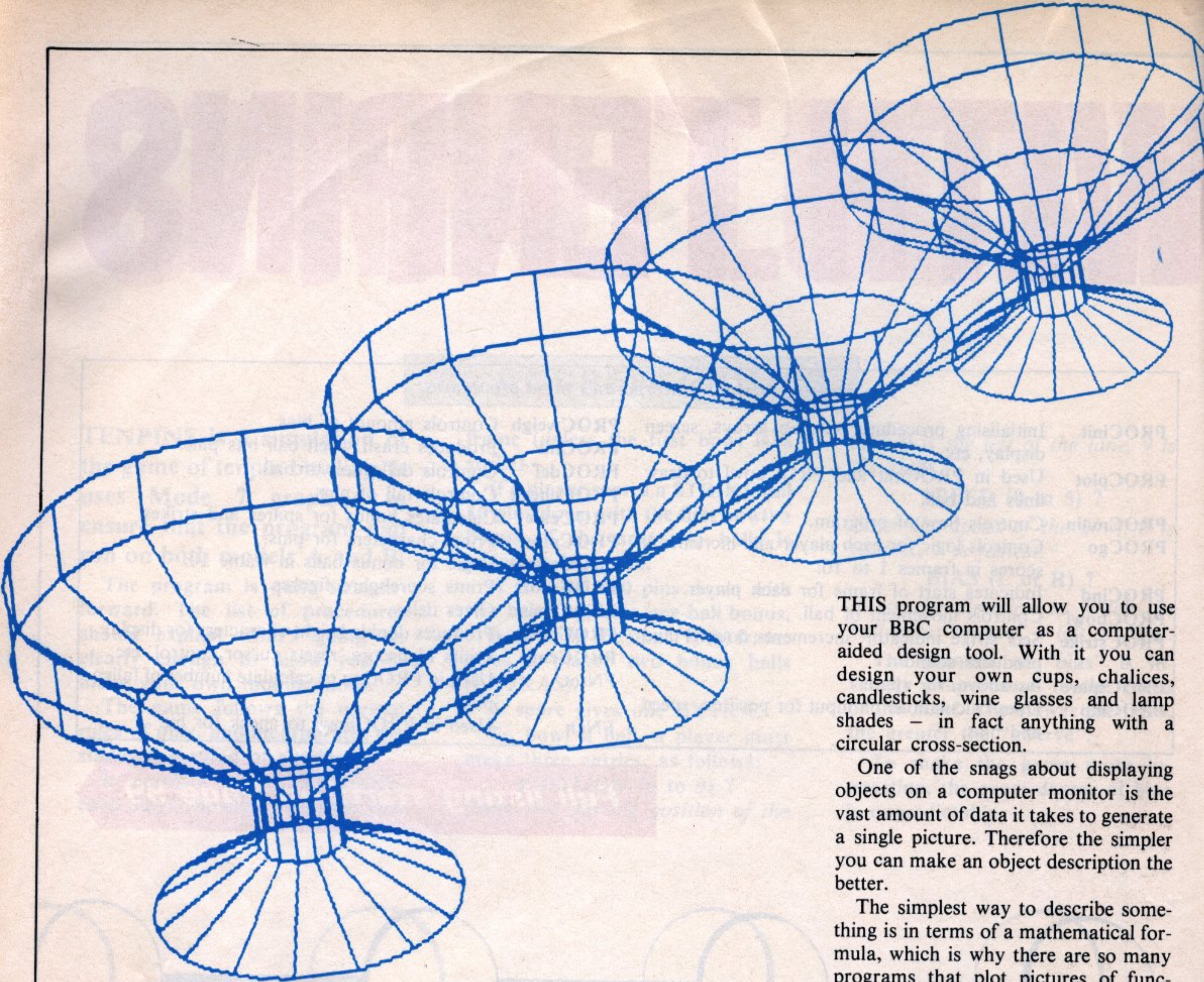
WITH TENPINS

The program structure incorporates these procedures:

PROCinit	Initialising procedure: sets up arrays, screen display, etc.	PROCweigh	Controls amount of bias.
PROCplot	Used in PROCinit and PROCbowl to draw lines and ball.	PROChit	Produces crash when ball hits pins.
PROCmain	Controls flow of program.	PROCdef	Controls deflection of ball.
PROCgo	Controls logic for each player and increments scores in frames 1 to 10.	PROCcheck	Controls fall of pins.
PROCind	Indicates start of frame for each player.	PROCcalc	Calculates bonus for spares and strikes.
PROCbowl	Controls movement of ball.	PROCpins	Prints characters for pins.
PROCstrike	Sets strike indicator, increments counter and produces sound.	PROCextra	Logic for bonus balls in frame 10.
PROCspare	As above, for spare.	PROCscore	Prints scoreboard figures.
PROCinp	Does calculations on input for position, speed and bias.	PROCwait	Gives delay.
		PROCprint	Produces double height characters for display.
		PROCend	Prints highscore, resets cursor control, etc.
		FNtot	Used in PROCgo to calculate number of fallen pins.
		FNch	Used in PROCbowl to check for hit.

Full listing starts on Page 99





THIS program will allow you to use your BBC computer as a computer-aided design tool. With it you can design your own cups, chalices, candlesticks, wine glasses and lamp shades – in fact anything with a circular cross-section.

One of the snags about displaying objects on a computer monitor is the vast amount of data it takes to generate a single picture. Therefore the simpler you can make an object description the better.

The simplest way to describe something is in terms of a mathematical formula, which is why there are so many programs that plot pictures of functions. However these functions are not real objects, neither can a real object be described in terms of mathematical functions.

The simplest way to describe a real object is to give each corner or vertex a set of spatial co-ordinates, usually X, Y and Z. The object can then be displayed by drawing lines between these vertices.

The co-ordinates can be subjected to multiplication by various scaling factors, enabling the object to be drawn as if viewed from any position.

However, for an object of any greater complexity than a cube, the acquisition of the data and its entry into the computer are somewhat tedious. What is needed is a simple interactive way of inputting data and then making

Rotate your profile to artistic effect

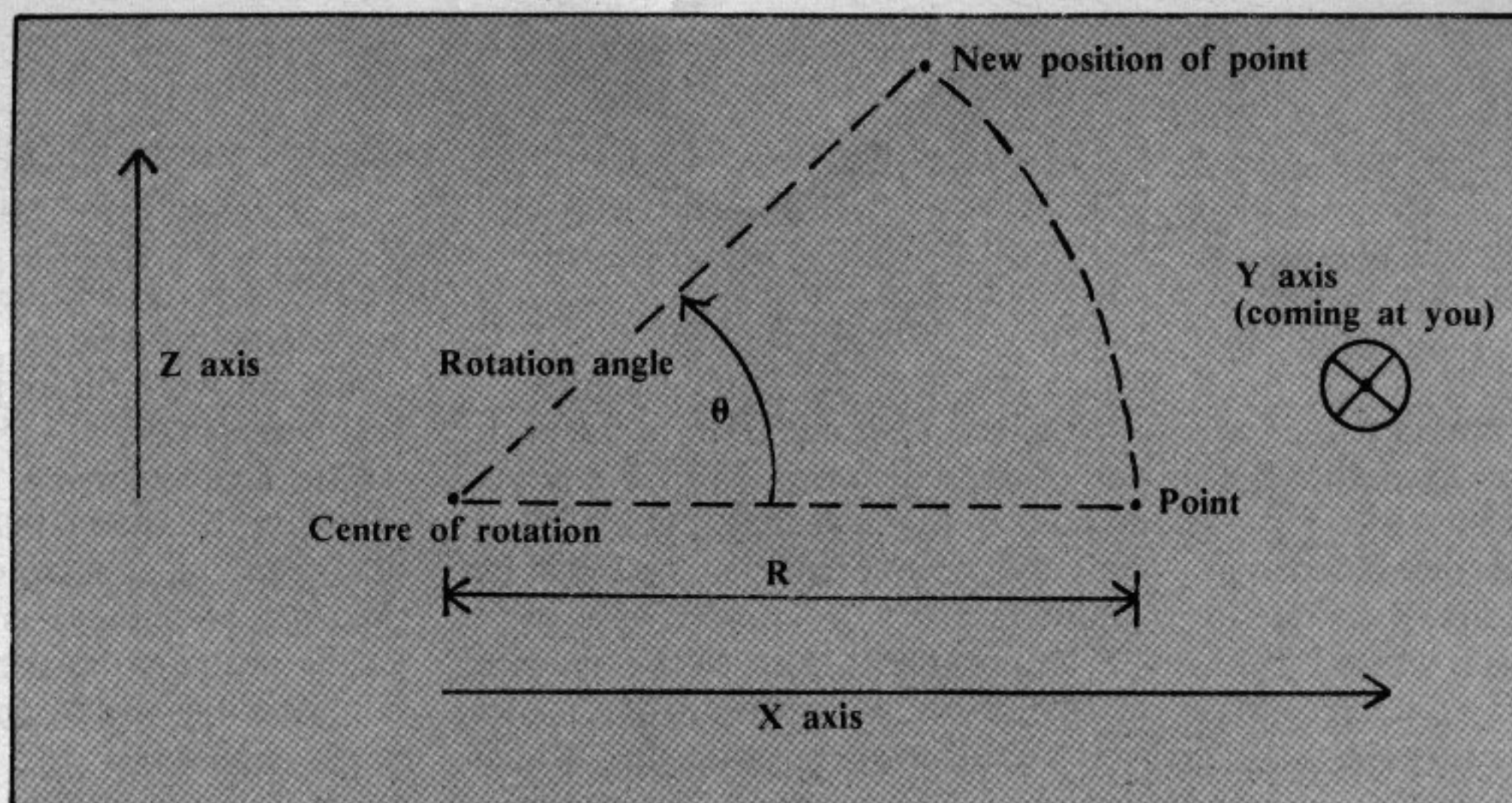


Figure 1: The rotation of a point

the most of it.

After a sentence like the last it will come as no surprise for you to find that this program does just that!

If an object has a circular cross-section then it is only necessary to input the profile of the object and let the computer generate all the points needed to draw it.

Consider Figure 1. You are looking down onto a point with the Y axis coming out of the paper at you.

If you rotate that point through some angle, Θ , it will have new X and Z co-ordinates but the same Y co-ordinate. The new values will be:

$$X=R*\cos(\Theta)$$

$$Z=R*\sin(\Theta)$$

where R is the distance between the point and the centre of rotation.

If this is repeated for many different angles of rotation we can create a whole host of points from the one original value. This will then produce a circle composed of many points.

The co-ordinates of each point can in turn be multiplied by a transformation matrix – this just means set of numbers – to reveal the co-ordinates of that circle as viewed from any angle.

If this is repeated for a few different points we can generate a solid of rotation.

All that is needed then is a way of entering the original points. It is possible to draw the points that make up the profile on a piece of graph paper, read off the position of each and type it into the computer.

However, changing the profile until you have the right design is messy and repetitive and a computer thrives on repetitive tasks. A better way is to use the computer interactively to produce and edit the profile.

One technique of doing this is called

“rubber banding”. This is a technique by which the controlling points of a shape can be moved and the lines to and from them also move as if connected by a rubber band. In this way a shape can be generated and changed interactively until it is just right.

This program allows you to enter a profile using rubber banding techniques

By MIKE COOK

and then draws the isometric projection of the solid created by rotating that profile. The profile may then be edited and the new shape drawn.

The program first asks how many points you want to include to define the profile. Nineteen is the maximum number and is more than enough, I tend to use between three and seven.

Note that this is the only point in the program where you have to press the Return key.

The screen then shows a dotted line, which is to be the axis around which the points are rotated. On the left hand side is a line which is the initial profile.

To select a point just press the key corresponding to its number. For point numbers greater than nine, holding the shift key down adds ten to the value of the key pressed. For example, to select point 14 hold down the shift key while pressing four.

Providing you have selected a valid point you will see it flash. If this is not the point you want to move simply select another. Number 1 is the bottom point and the numbers increase as they move up the profile.

Having selected a point it may be moved by using the four cursor control

keys. Holding the keys down makes them auto repeat and the point may be steered into place.

When you have the profile you want you can see the solid of rotation by typing the “D” for draw key. After you have studied it, typing any key brings you back to edit the profile.

You can type “N” to select a new number of points or to start again from the initial position. To exit the program hit the Escape key.

As the cursor keys have been used to edit the profile you must reset them to perform the normal editing function. This can be done by pressing function key 0.

For those of you who want to tinker with this program here are a few notes about how it is constructed:

Lines 10-290 comprise the instructions and setting up of initial values. The value RT in line 270 determines the number of points generated in the rotation. This is also half the number of vertical lines to be drawn. The given value is a good compromise between detail and speed of drawing. The value PR in line 280 gives the point of rotation.

Lines 300-380 initialise the points in the profile and draw it. The profile control points are stored in a two dimensional matrix P(A,B), where A is the point number and B is the axis, such that 0 = X axis, 1 = Y axis, 2 = Z axis.

Lines 390-980 allow the profile to be edited using the rubber banding technique.

Lines 660-950 draw the isometric projection of the solid, with lines 810-910 putting the vertical lines in every other point. You can change this by

From Page 45

altering lines 820 and 840.

Lines 960-1010 generate a new set of co-ordinates one step round the solid.

Lines 1020-1050 multiply the co-ordinates to give an isometric projection.

As a final note the eagle-eyed among you will have spotted that there are no lines 440 and 940. This is where I had a call to a routine to dump the screen to a printer when a P was pressed.

As many different screen dump programs have been published I will leave you to insert your own. A good one is published in the book "Assembly Language Programming for the BBC Microcomputer" by Ian Birnbaum.

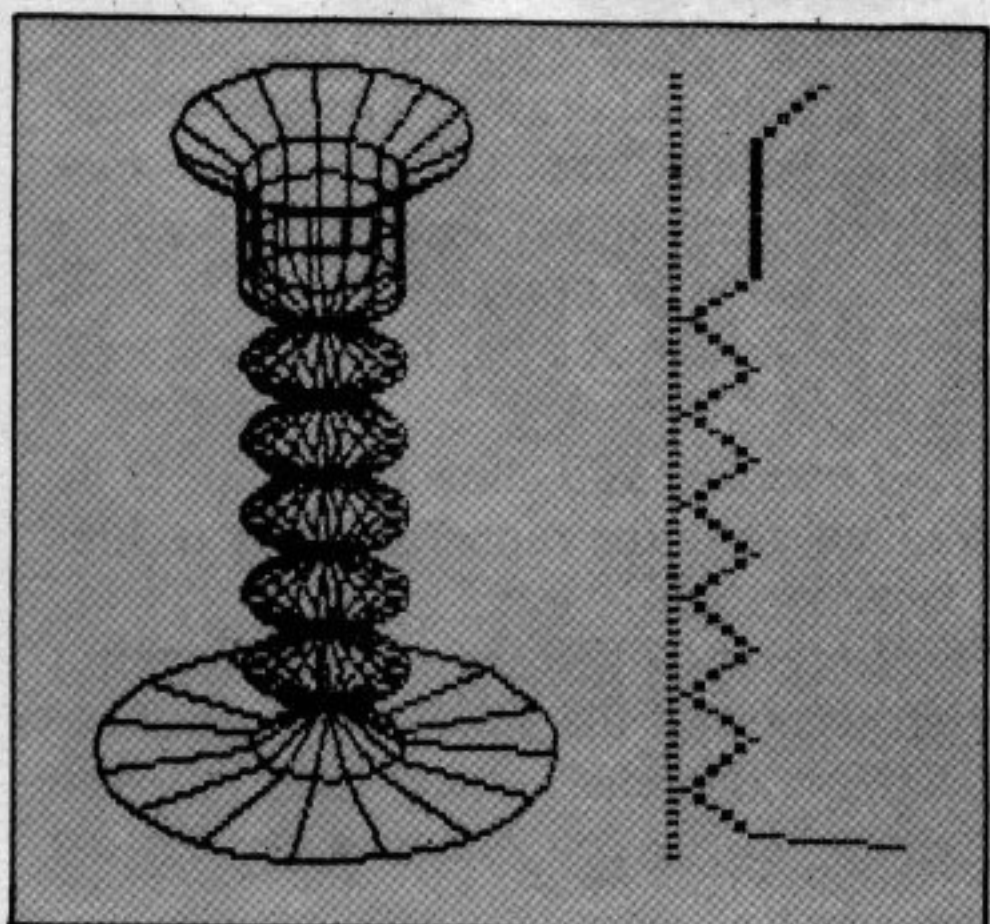
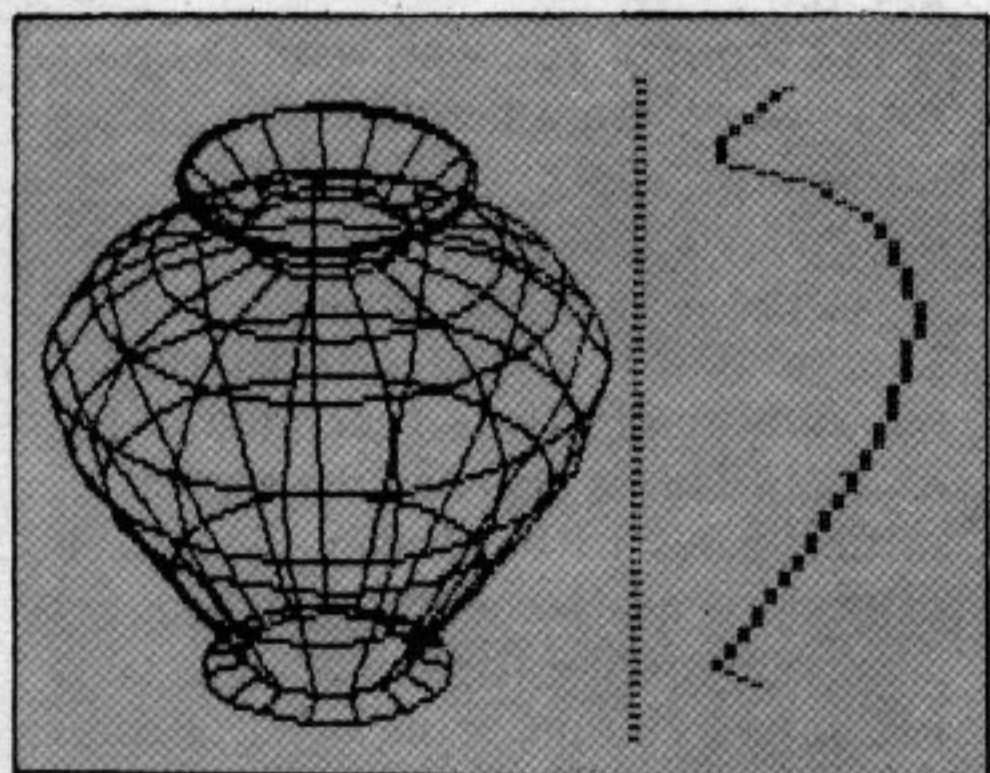
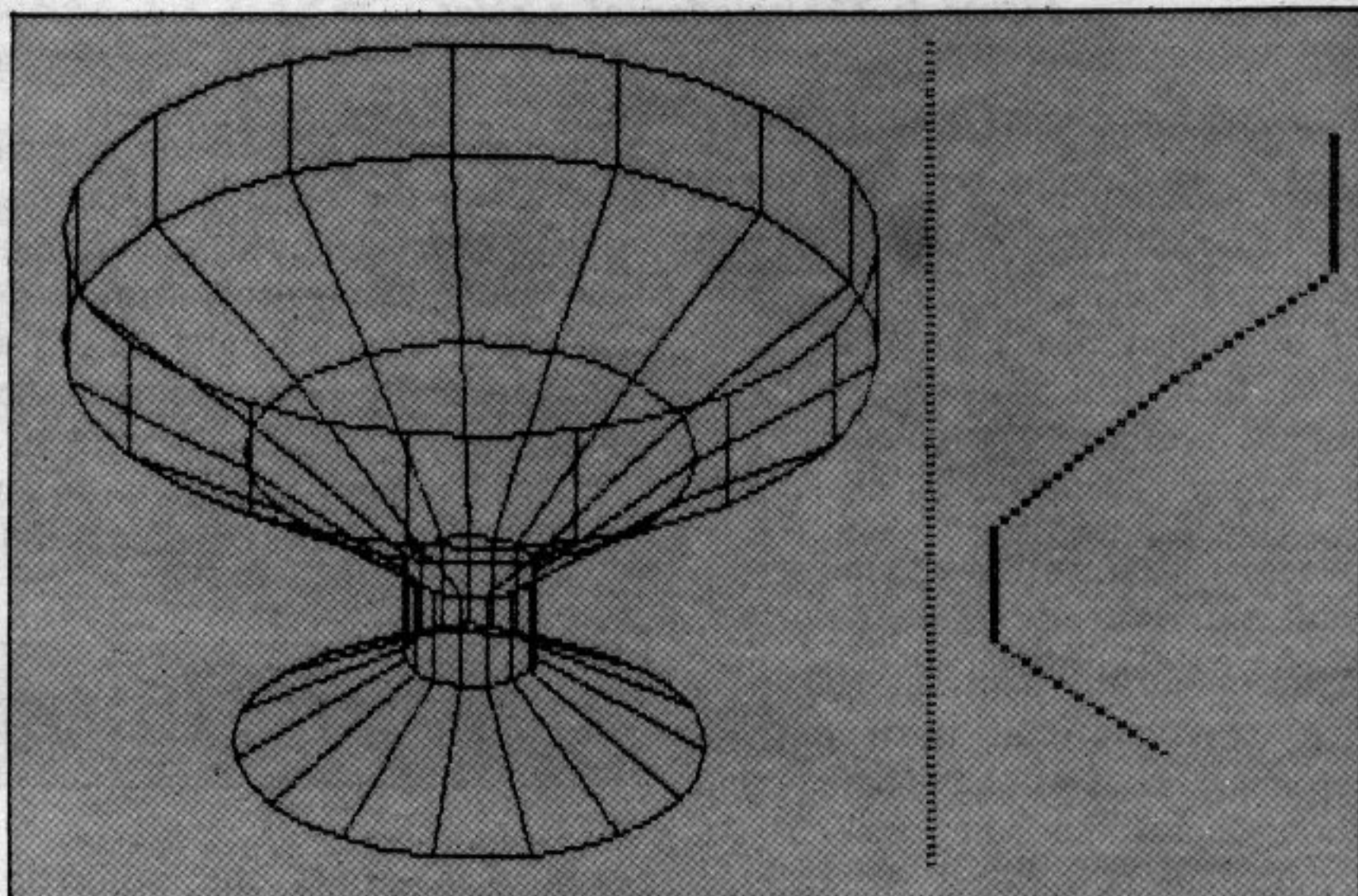
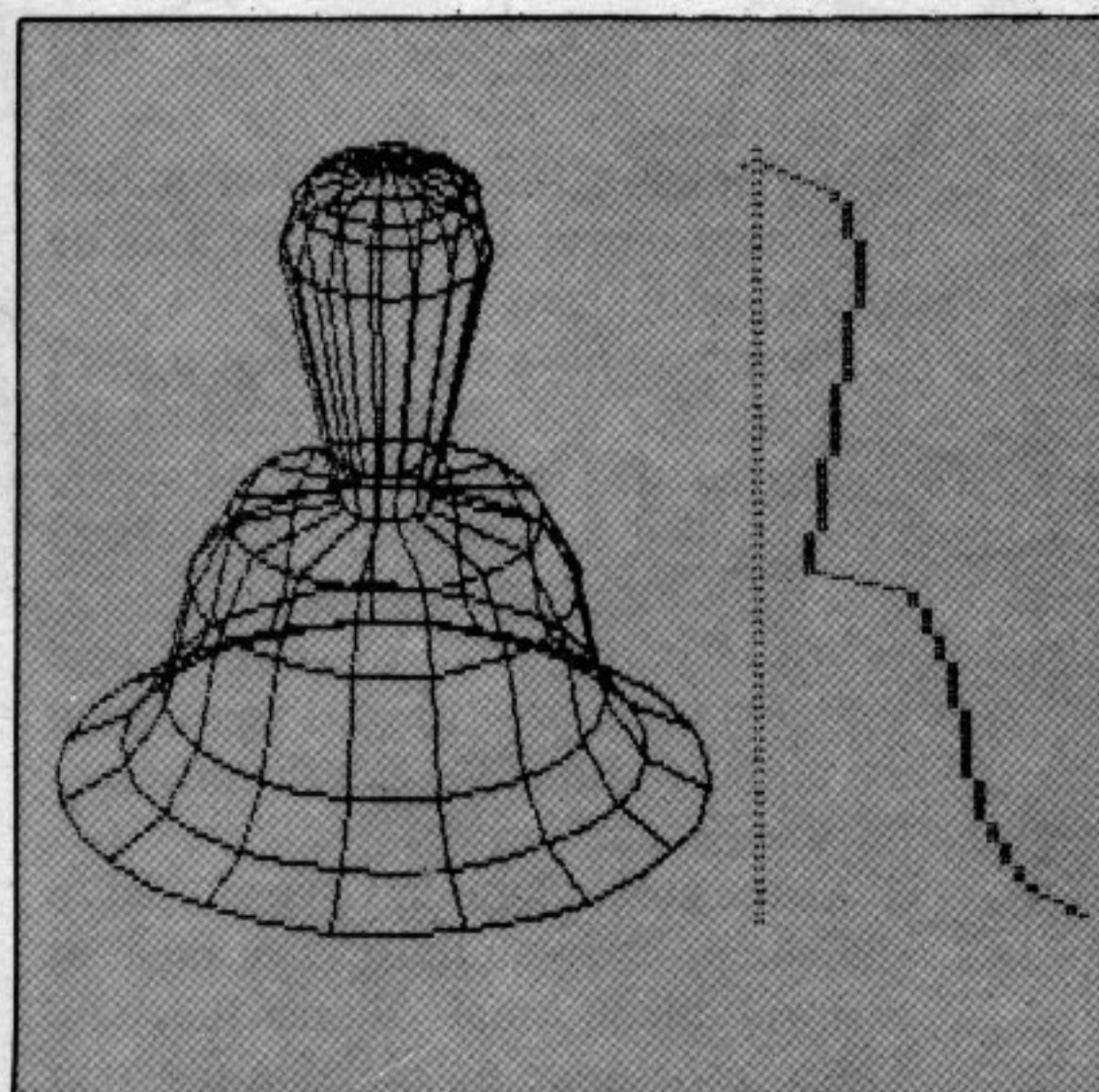
Note line 920: this restores the position of the screen axis. In itself this will do nothing to the display, but if it is not done the screen dump programs will be confused.

The program draws what is known as a wire frame view, as if the object were constructed of something trans-

parent — just the thing for a wine glass.

It is possible to write a routine to eliminate the hidden lines but this would slow down the drawing time considerably. Also a simple routine would not work for all possible profiles you could draw.

The accompanying diagrams show some of the many interesting shapes that can be constructed with this program. Note that it is also possible to let the profile cross the centre of rotation. See if you can predict what that would look like!



5 REM YOUR CUP RUNNETH OVER By Mik
e Cook

```
10 *KEY0 *FX4,0 IM
20 DIM P(19,2)
30 *FX4,1
40 MODE7
50 PRINT"SOLID OF ROTATION"
60 PRINT:PRINT
70 PRINT"THE ROTATION AXIS IS SHOWN
DOTTED"
80 PRINT:PRINT
90 PRINT"1) FIRST DRAW THE PROFILE"
100 PRINT
110 PRINT"SELECT THE POINT YOU WANT"
120 PRINT"TO MOVE BY TYPING IT'S NUM
BER"
130 PRINT"HOLD DOWN SHIFT FOR NUMBER
S >9"
140 PRINT
150 PRINT"MOVE IT WITH THE CURSOR KE
YS"
160 PRINT"CONTINUE UNTIL YOU HAVE DE
SIRED PROFILE"
170 PRINT
180 PRINT"THEN"
190 PRINT"2) TYPE D TO DRAW THE SOLI
```

D OF ROTATION"

```
200 PRINT"THEN ANY KEY TO EDIT PROFI
LE"
```

```
210 PRINT
220 PRINT"TYPING N WILL RETURN TO TH
IS PAGE"
```

```
230 PRINT:PRINT
240 INPUT"INPUT THE NUMBER OF POINTS
TO USE",NT
```

```
250 IF NT>19 THEN PRINT "LESS THAN 2
0 PLEASE":GOTO 240
```

```
260 IF NT<2 THEN PRINT"TRY AGAIN":GOTO
240
```

```
270 RT=30
```

```
280 PR=650
```

```
290 MODE 2
```

```
300 FOR N=1 TO NT
```

```
310 P(N,0)=700
```

```
320 P(N,1)=(600/NT)*N
```

```
330 NEXT
```

```
340 MOVE PR,0 : PLOT 21,PR,1027
```

```
350 MOVE P(1,0),P(1,1)
```

```
360 FOR N=2 TO NT
```

```
370 DRAW P(N,0),P(N,1)
```

```
380 NEXT
```

```
390 K=GET
```



```

400 N=K AND &F
410 IF INKEY(-1) THEN N=N+10
420 IF K=6B THEN MODE 0 :PROCRAW:MO
DE 2:GOTO 340
430 IF K=7B THEN GOTO 40
450 IF N>NT OR N<1 THEN GOTO 390
460 PLOT 70,P(N,0),P(N,1)
470 MOVE P(N,0),P(N,1)
480 REPEAT
490 K=GET
500 S=1
510 PROCINVPLT(7)
520 IF K=&8B THEN P(N,0)=P(N,0)-4:S=
0
530 IF K=&89 THEN P(N,0)=P(N,0)+4:S=
0
540 IF K=&8A THEN P(N,1)=P(N,1)-2:S=
0
550 IF K=&8B THEN P(N,1)=P(N,1)+2:S=
0
560 PROCINVPLT(5)
570 UNTIL S=1
580 GOTO 400
590 DEFPROCINVPLT(OP)

```

```

600 IF N=1 THEN MOVE P(N,0),P(N,1):G
OTO 630
610 MOVE P(N-1,0),P(N-1,1)
620 PLOT OP,P(N,0),P(N,1)
630 IF N=NT THEN GOTO 650
640 PLOT OP,P(N+1,0),P(N+1,1)
650 ENDPROC
660 DEFPROCRAW
670 CLS
680 VDU 29,640;200;
690 C1=.707107:C2=.408248
700 C3=.816597:C4=-C2
710 TI=2*PI/RT
720 FOR N=1 TO NT
730 TH=-TI
740 FOR R=1 TO RT+1
750 TH=TH+TI
760 PROCROTATE
770 PROCTRANS
780 IF R=1 THEN MOVE X,Y ELSE DRAW X
,Y
790 NEXT R
800 NEXT N
810 REM PUT IN THE VERTICAL LINES

```

```

820 TI=TI+2
830 TH=-TI
840 FOR R=1 TO RT+1 STEP 2
850 TH=TH+TI
860 FOR N=1 TO NT
870 PROCROTATE
880 PROCTRANS
890 IF N=1 THEN MOVE X,Y ELSE DRAW X
,Y
900 NEXT N
910 NEXT R
920 VDU 29,0;0;
930 K=GET
950 ENDPROC
960 DEFPROCROTATE
970 TH=P(N,0)-PR
980 X=TH*COS(TH)
990 Y=P(N,1)
1000 Z=TH*SIN(TH)
1010 ENDPROC
1020 DEF PROCTRANS
1030 Y=C2*X+C3*Y+C4*Z
1040 X=C1*X+C1*Z
1050 ENDPROC

```

BBC MICRO IN SCOTLAND



Model B £399 EX-STOCK with Free cassette lead worth £4
WITH THE LATEST 1.2 OPERATING SYSTEM

DISC DRIVES

Teac CS50A Single, 100K	£212.75
Teac CD50F Dual, 800K	£667.00
Teac CD50A Dual, 200K	£396.75
Cable and Format Disc & Manual	£21.50
Torch Z80 Disc Pack, 800K	£874.00

PRINTERS

Seikosha GP100A	£226.50
Seikosha GP250X	£271.50
Epson FX80 III	£488.75
Interface Cable for above	£15.00

MONITORS

Microvitec 14"	£287.50
Cabel 14"	£230.00

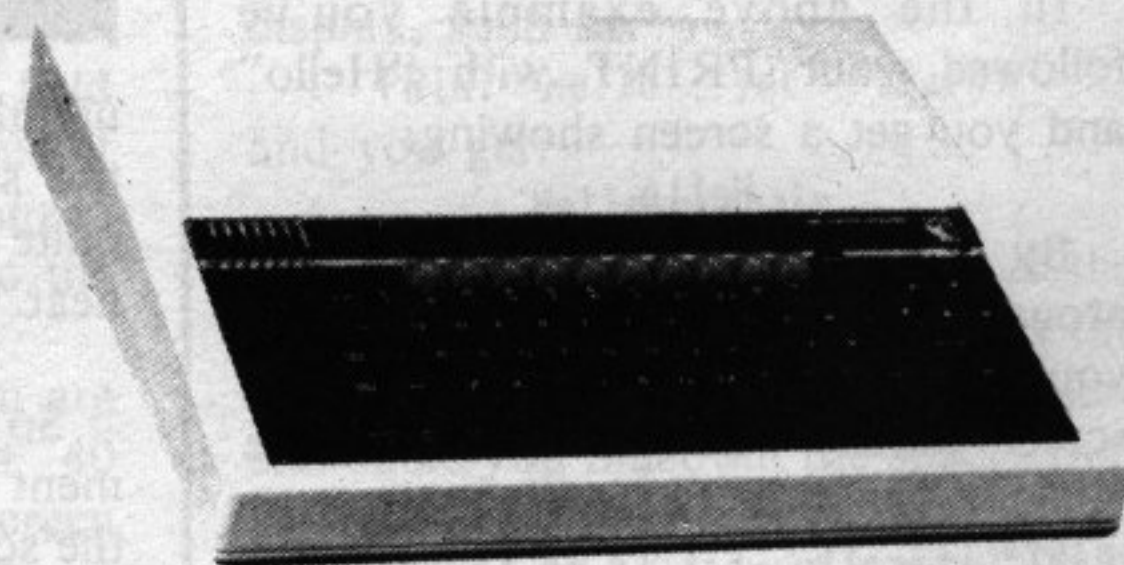


EST. 1824

ANDREW WHYTE & SON LTD

(Authorised BBC Dealer and Service Centre)

MAIL ORDERS TO: CONSTABLE HOUSE,
HOPETOUN STREET,
EDINBURGH EH7 4NF
TEL: 031-556-0191 (M-F 9-5.30)



SOFTWARE: Full range of ACORNSOFT, IJK, MICRO-POWER, GEMINI, PLEASE CALL OR SAE FOR LIST. (ADD 50p POST PER ORDER.)

Carriage £6 per item, all prices include VAT, please check price before ordering.



EDUCATIONAL & BULK DISCOUNTS AVAILABLE

I LOOKED up from my desk as the editor stumbled back from his lunch.

"You," he cried, "still here?"

"Yes," I replied sarcastically. "I'm hoping to get into print sometime."

"Well now's your chance. Get into PRINT and write about it – and I want it yesterday."

He negotiated the door of his office (giving me an idea for a game where you have to guide an alcoholic editor through a set of desks). With a sigh I reached for my keyboard. PRINT ...

THE strange thing about the PRINT command is that it doesn't actually print anything. At least, it doesn't print anything on paper. All it does is to tell your micro to display on the TV screen whatever follows the PRINT statement.

For example, if you want to display the word "Hello" on the screen (which beginners' books seem to assume you do with sickening regularity) you type:

`PRINT "Hello"`

and press the Return key. The word Hello then appears on the screen and, presumably, some people think the micro's talking to them.

What you've done is to use the PRINT statement to tell the micro to "print" something on the screen. What actually appears on the screen depends on the "print list", the items that follow the PRINT statement.

In the above example you've followed your PRINT with "Hello" and you get a screen showing:

Hello

By putting the inverted commas around the word following PRINT, you've told the micro to show on the screen exactly what came between the inverted commas. Try a few more, e.g.: `PRINT "Literally what is in inverted commas"`

or:

`PRINT "Notice that the inverted commas themselves aren't printed."`

and you'll get the idea. Whatever comes between the inverted commas after a PRINT statement is displayed on the screen – punctuation marks, spaces and all. (Don't forget to press Return to send the information into the micro.)

Having said that, beware using inverted commas in the middle of what you want to display as it plays havoc. When it reaches the second set of in-

**They say the pen is mightier
than the sword... and**

PRINT
is pretty powerful, too!

verted commas the micro thinks that it has come to the end of what it has to print and confusion arises for you, and for the machine! Try this and see what happens:

`PRINT "I said"Hello"`

Fun isn't it? What happened is that the micro has come to the first set of inverted commas and has decided to print out everything until it comes to the next set. When it reaches these it assumes that it has done its job and all the rest of the line is a bit confusing to it. Is it a variable or what? The micro doesn't know and tells you so.

The way to get round this is just to

**By NIGEL
PETERS**

use the apostrophe that you'll find on the same key as 7. This is accepted quite happily by the micro and looks neat. Try:

`PRINT "I said 'Hello.'"`

So now we can use the print statement to display whatever we want on the screen. We can also use it to do our sums.

Suppose that for some reason best known to you, your maths teachers and the authors of beginners' books you want to use the micro to add 2+2. All you do is enter:

`PRINT 2+2`

and press the Return key.

The micro will do the sum "in its head" and the answer will appear on the monitor. (In case you're wondering, it's 4.)

Obviously the example is trivial but the principle is the same for more difficult calculations: Now try:

`PRINT 3+4/3`

or maybe:

`PRINT (3+4)/3`

Both times the micro prints out the answer for you, and it will do so for much more complicated mathematical expressions. I leave it to you to do a few sums but can I point out that the micro follows the same rules you did at school – it does calculations from left to right in the order: brackets, division, multiplication, subtraction and addition.

Don't worry if you don't follow that last bit. You'll understand it when you need it.

You might notice that if you try to print out some variable name that doesn't exist yet, the micro doesn't like it and tells you so. Try:

`PRINT Z`

and see what you get. This is because you haven't set up the variable in an assignment statement like:

`LET Z=3`

or whatever. The variable has to exist somewhere in its memory for the micro to PRINT it to the screen. Having said that, you might notice that the micro will accept a number and display it quite happily, treating it almost as a string. For example,

`PRINT 3`

puts a figure three on the screen. That is, it displays literally what comes after the PRINT statement without needing the inverted commas.

If you've followed all this so far you are now able to use your micro to do things like:

`PRINT "Hello Mum"`

or:

`PRINT (1*1)/1`

but it's all a bit limited as we've been using only command mode. So everything we've told the micro to do

has been done immediately.

Is PRINT the same in the middle of a program? Yes it is but it can be much more powerful, and is one of the regular features of nearly all programs. Here is one stupid program:

```
10 PRINT "This is a silly program"
20 PRINT 2+2
30 PRINT "I told you it was silly"
```

Again, it's trivial but it shows that PRINT works in programs. And when a PRINT statement is combined with variables then it becomes a very powerful tool.

If you don't know what a variable is may I refer you to my editor's brilliant series of articles on beginners' Basic. (OK, so I'm crawling but I've got a wife and tabby to support.) For those who, wisely, prefer my epic words I'll give you a brief recap of what a variable is.

Remember those sums at school where you had to figure out what "X" stood for? All you knew was that it was some number or other. Well "X" was a numeric variable, a name used for the time being until you could figure out what number it stood for.

In BBC Basic you have two types of variables – numeric variables which, as you might guess, stand for numbers, and string variables.

You've already met a string when we used PRINT to display Hello on the screen. A string is just a collection of letters, spaces and punctuation marks that can be treated in one lump by the micro. We tend to bundle up the whole lot between quotes.

Now suppose you had a string that you wanted printed on the screen. Something like: "You are a brilliant programmer". Instead of having to write this into your program every time we wanted to feel smug, wouldn't it be handy if we could just refer to it by a shorter "label"? Well such a label is a string variable. You can tell string variables because they all have names ending in \$.

Now we can use the PRINT statement with these variable names to display items from our programs. Even if we don't know what they'll be when we write our program, we can give them a variable name and tell the micro to print them out when it's figured out what they are.

```
Take the following program which
asks for a number and then doubles it:
10 LET A$="PLEASE ENTER A NUMBER"
20 LET B$="THIS IS DOUBLE YOUR NUMBER"
30 PRINT A$
```

```
40 INPUT X
50 LET Y=2*X
60 PRINT B$
70 PRINT Y
```

As you can see, we've used both string and numeric variables, and the micro has printed on the screen not the variable itself but whatever it was labelling, in full. You might notice that we could get rid of line 50 and get the same result by doing the calculation in the last line, such as:

```
70 PRINT 2*A
```

Try it for yourself. Set up some variables and use PRINT to call them to the screen by their variable names. "Playing" on your micro is the best way to learn.

Also, you might want to test your powers of discrimination by figuring out the difference between:

```
PRINT 2+2
```

and:

```
PRINT "2+2"
```

If you want a hint about the last, try:

```
PRINT "Two plus two"
```

You've probably already noticed that the micro treats the different types of variables in different ways.

If you enter:

```
PRINT "Hello, again"
```

it appears on the left of the screen. Now if you print out a number, like this:

```
PRINT 2+2
```

the answer appears slightly indented from the edge of the screen.

The explanation is that the micro divides the screen into a number of separate "fields" of fixed length. When you switch on the machine the field lengths are fixed at the default value of 10 characters. (This can be changed but for the moment we'll stick to the default value.)

Mode 7, which is the mode you are in when you switch on, is a 40 character mode. This means the screen can hold 40 characters on one line.

If you accept that the micro divides the screen into fields each of which is 10 characters in length, then in Mode 7 you have four of these fields. Again in an 80 character mode, dividing by the field length of 10 gives you eight fields.

It's these fields that cause the difference in the way variables are printed on the screen. With strings what happens is that the first character of the string is displayed in the left-most character of the field. The next character is in the next field space and so on from left to right.

On the other hand, numbers are

printed with their last figure on the last character of that field. The following simple program should show what I mean.

```
10 PRINT 0123456789
20 PRINT 1
30 PRINT "A"
40 PRINT 12
50 PRINT "AB"
60 PRINT 123
70 PRINT "ABC"
```

As you can see, strings and numerics use the fields in different ways. Try expanding the program until your strings and numbers fill the whole 10 characters of the field. What happens when you spill over? Again try it and see.

With strings, the micro just spills over into the next field. With numbers, it does something slightly different which I'll explain when I unravel how to change the field lengths.

Maybe you'll have noticed that the example program used only the first of the screen fields. How do you get to print things in the other fields?

The answer is that you use punctuation marks in the print line (the things that follow the PRINT statement). Using these you can PRINT out several items in a print line, using only one PRINT statement and deciding in which field they appear by your choice of punctuation marks.

The first "punctuation mark" isn't really a punctuation mark at all. It's a space. Suppose you leave spaces between some strings you want to display, such as:

```
PRINT "Hello" "yet" "again"
```

and you get:

```
Helloyetagain
```

on the screen. The micro ignores the spaces and prints them all one after the other. To make this more understandable you must put the spaces that you want between the words on the screen inside the inverted commas that define the strings that you want printed, like:

```
PRINT "Hello" "yet" "again"
```

When you put spaces between numbers the micro prints them in different fields. Try:

```
PRINT 1 2 3
```

if you don't believe me. You get:

```
1      2      3
```

The comma works slightly differently.

```
PRINT "Hello","yet","again"
```

produces:

```
Hello    yet    again
```


From Page 49

because the comma tells the micro to display the next item in the print list in the next unused field. This may be on the next line, such as:

```
PRINT "a","b","c","d","e"
```

With numbers, the comma has the same effect as shown by:

```
PRINT 1,2,3
```

which gives:

```
1      2      3
```

Incidentally, you might notice that this gives the same effect as using spaces.

The semi-colon has the effect of joining the item after it to the item before, effectively overriding the effects of the fields. With numbers you get a command like:

```
PRINT 1;2;3
```

returning:

```
123
```

The micro has printed the first figure normally in the tenth column of the field and then, because of the semi-colons, has joined on the other two figures. As you might guess this can be the cause of confusion at times (as can

two fields of figures running into each other on the screen).

With strings, the semi-colon works just like spaces, joining them together.

```
PRINT "Hello ";"yet";" again"
```

gives:

```
Hello yet again
```

(You'll notice that I put the spaces I wanted between the words in the strings.)

Finally we come to the apostrophe which, when put between items in a print line, forces the micro to print the next item on a new line.

```
PRINT 1'2'3
```

thus gives:

```
1
2
3
```

while:

```
PRINT "Hello""yet""again"
```

displays:

```
Hello
yet
again
```

on the screen.

The fun really starts when you get to mix the punctuation and the different

types of print item up in the same print lines.

Try it yourself. Can you make the micro print in the centre of the screen?

The answer is 23

It's not hard. It just takes a little thought.

It might help if I told you that just using the PRINT command by itself makes the micro skip to the beginning of the next line.

If you clear your screen (CLS and the Return key) and enter:

```
PRINT
```

```
PRINT
```

```
PRINT "Hello"
```

you'll see what I mean.

But using PRINT statements with punctuation marks is the long way of doing it. I'll tell you an easier way doing it in another article when I'll also be describing the limitations of the print fields and how you can change them.

As it is, I haven't the time. I've got to help the editor find his way through these desks so he can go home. I wonder if there is a game in that?

BES

Bourne Educational Software

HAPPY NUMBERS (Code P22) £7.80+VAT NEW!

Uses full colour graphics to present attractive images to encourage children to learn their numbers and count. No reading skills required for this very easy to use program.

- Children encouraged through attractive flower collection and happy/sad face responses to their entries.
- Full use of sound reactions, but only with correct answers!
- Incorrect entries show equivalent number, then original entry counts to correct number. Records every entry to identify problem figures.

Suitable for 4-6 year olds and BBC Model B.

WORLD-WISE (Code P19) £7.80+VAT NEW!

Two programs enabling children to build up fascinating information banks on their favourite geography subjects. Covers both UK and World in a series of 10 categories including, e.g. canals, towns, antiquities, etc. Your atlases and reference books well used as they try to find a river that passes through the Equator, or who built the Parthenon! Features:

- Powerful review/edit facilities to correct entries if required.
- Save and load the data at any time.
- Personalised responses with attractive sound.
- Maintains extensive information on individual childrens' entries.

Suitable for ages 7-15 and BBC Model B.

WORDHANG (Code P20) £7.80 + VAT

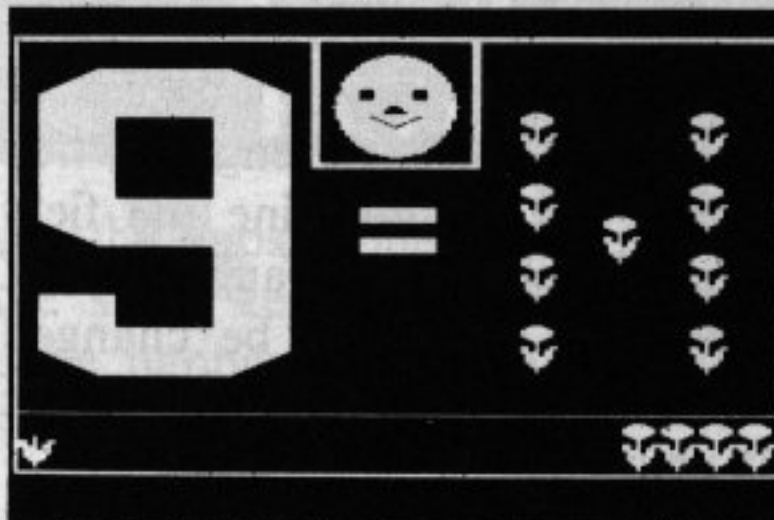
Educational version of 'hangman' word game, with full colour graphics and simple but attractive screen layout. Children no longer find learning to spell a chore as they try to keep him alive! Host of attractive features include:

- Lists totalling 260 words to suit reading age/subject. Facility to create and save own lists - ideal for that weekly spelling list!
- Time limit can be set for each guess.
- Monitors individual childrens' performance - time taken, list used, correct/incorrect attempts, etc.

Suitable for ages 5-13 years and BBC Model B.

QUALITY EDUCATIONAL PROGRAMS

"... already proving very useful and popular... envisage being widely used by children." Mr I. Wilson, Headmaster, Weybridge C.E. Middle School.



HAPPY NUMBERS SCREEN

TIMEMAN ONE (Code P23) £7.80 + VAT JUST RELEASED!

Children will love learning to tell the time and set the clock with TIMEMAN ONE. Right/wrong answers shown by happy/sad faces and figure climbing up (or down!) ladder. On completion of each stage the figure dances a jig to a tune and plants a flag.

Choice of any one of progressive stages comprising:

- Telling hours • Telling minutes • Telling hours and minutes
- Setting hours • Setting minutes • Setting hours and minutes
- Attractive use of sound, but level adjustable. • Children shown the correct answer after each wrong entry, and the chance to try again. • Features full BES MONITOR - records individual childrens' separate entries. • Ability and needs easily identified, practice at specific stages can then be chosen.

Ideal for 4-9 year olds and BBC Model B.

ANIMAL/VEGETABLE/MINERAL (Code P21) £4.95 + VAT

Think of an object and see if the computer can guess it correctly! Children love 'educating' the computer as it fails to get the answer right.

- Stimulates fascinating (and educational!) discussions as to the difference between alligators and crocodiles, and whether oil is vegetable or mineral.
- Encourages use of reference books as children try to find the answers to their own questions.
- Maintains full information on individual childrens' entries.

Suitable for ages 7-13 years and BBC Model A and B.

All programs feature cassette sized explanatory booklet. Postage and packing FREE. For 24-hour despatch by first-class post, send cheque to BES now!

Quantity	Code	Item	Format	Price	Total
_____	19	World-Wise	Cass.	£8.97	£
_____	20	Wordhang	Cass.	£8.97	£
_____	21	Animal/Vegetable/Mineral	Cass.	£5.69	£
_____	22	Happy Numbers	Cass.	£8.97	£
_____	23	Timeman One	Cass.	£8.97	£

I enclose cheque payable to BES

Total: £

Name

Address

BES, Dept BU4, Bedfield Lane, Headbourne Worthy,
Winchester, Hants SO23 7SQ. Tel: (0962) 882474

B B C

SYNERGY SOFTWARE

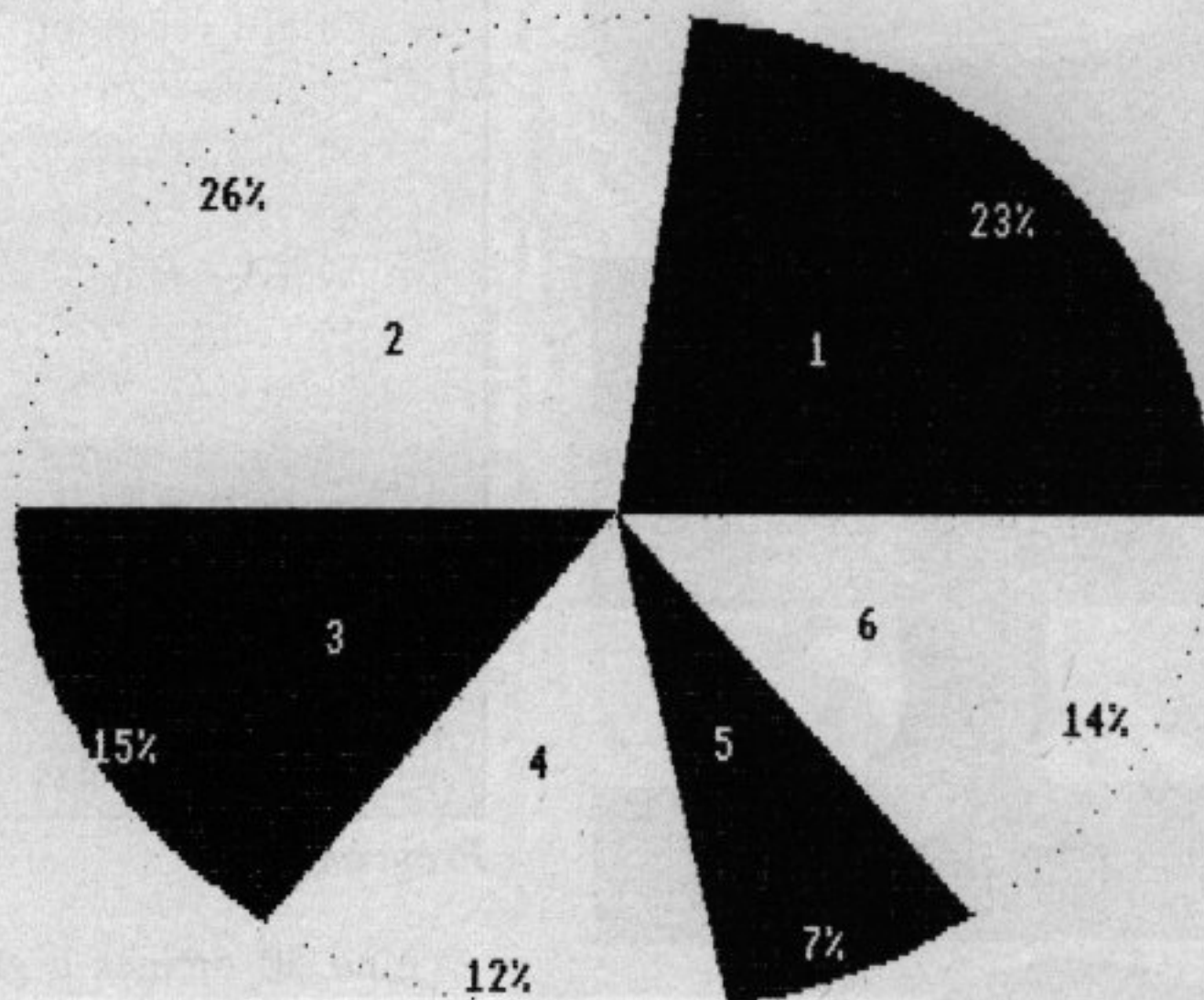
EASIPILOT the PROFESSIONAL graph program for the BBC Micro – Model B 32K (cassette only)

**To mark our entry into the U.K. software market we offer you
this remarkable program for £15.95 inc. post and packing.**

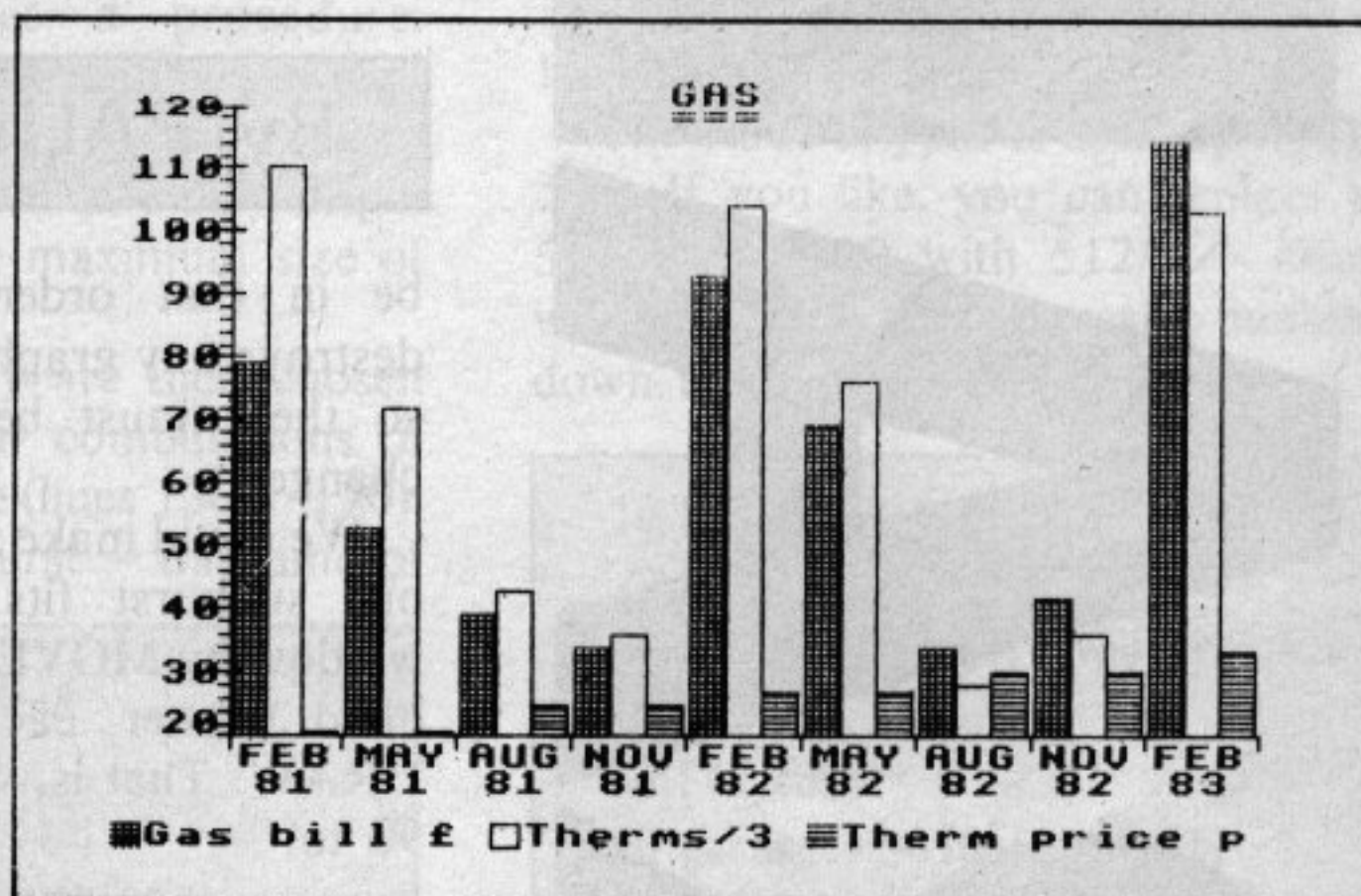
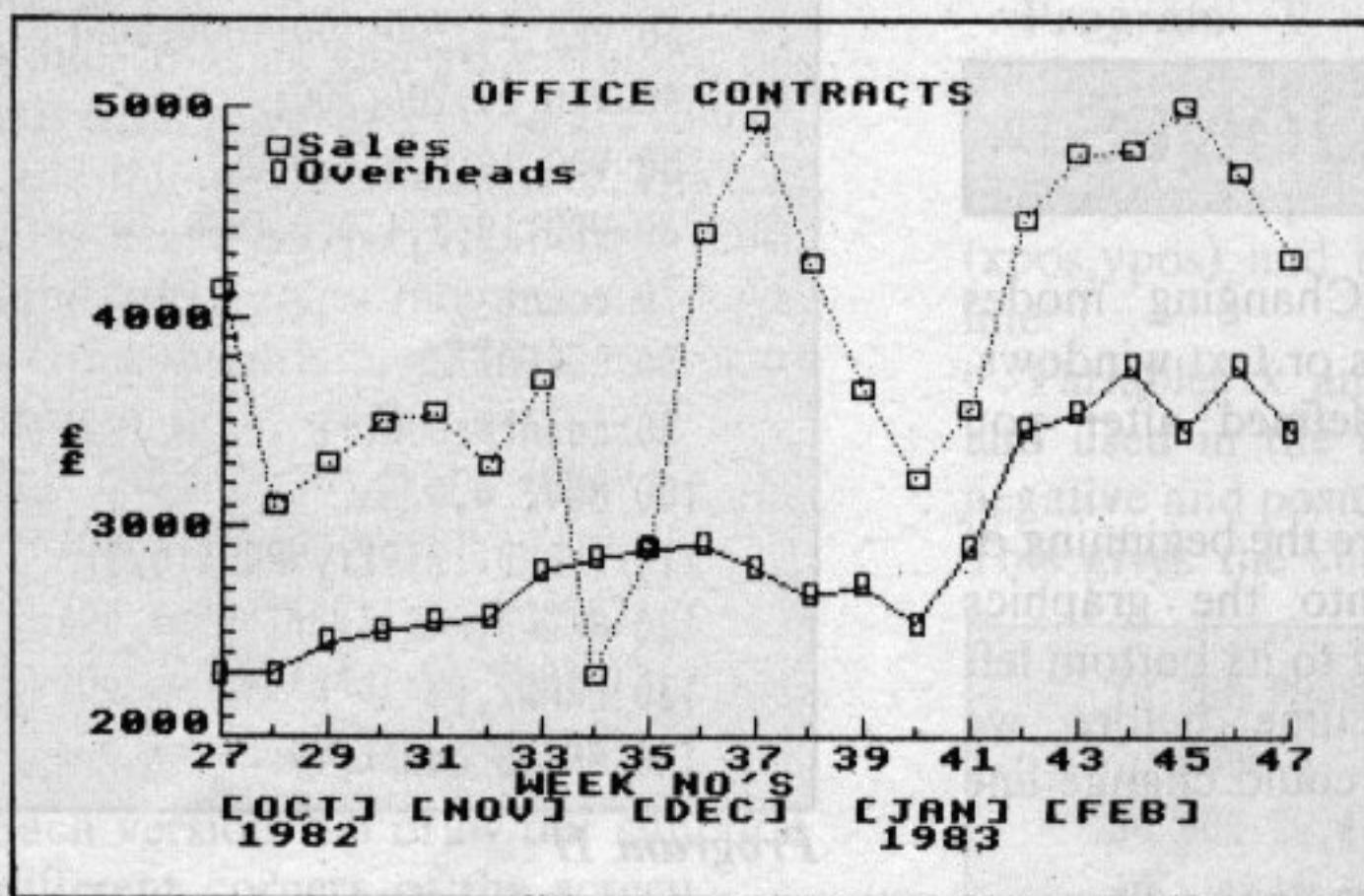
"EASIPILOT" is menu driven, simple to operate-educational-powerful
in performance and will produce "hard copy" on Epson & Seikosha printers*.

Powerful features include:

- 3 PROGRAMS-lines-bars-pies
- DRAW save and merge up to 3 bars or lines
- DRAW/save up to 4 b&w/colour pies
- AUTOMATIC scaling, sort and labelling
- 100 CHARS of fixed description for each graph
- FULL edit capabilities
- CHOICE of 5 different bar types
- CHOICE of 10 different line types
- GRID option
- POWERFUL overwrite facility
- FULL cassette save/load/cat options
- MENU driven
- COMPREHENSIVE spiral bound manual
- M/C printer dump



EXCEPTIONAL VALUE-IDEAL for the HOME, OFFICE, BUSINESS and SCHOOL
Printer NOT essential as graphs can be stored on tape and subsequently edited.



Send £15.95 cheque/P.O. to Dept E, 7, St. Andrews Close, Slip End, LUTON, LU1 4DE.

PROGRAMMERS! ... we are looking for new and original software of any kind. Our standards are high but so are our rewards. Send us your programs or ideas. Our confidentiality and integrity are assured.

Name _____

Address _____

To assist future development of EASIPILOT please
state printer type if any. _____

* Epson MX80 & Seikosha (GP80A and GP100A)

The examples shown are reduced samples of EASIPILOT graphs with axis labels removed.

SUNBURST

WE saw in the June *Micro User* that you can define graphics windows by the use of VDU 24. However, when you define a window the graphics co-ordinate system does not change in line with this new window.

What this means is that (0,0), the point at the bottom of the graphics screen at switch on, doesn't automatically move to the bottom left hand corner of the window. This can lead to graphics effects being chopped off, as Program I demonstrates.

```
10 REM PROGRAM I
20 MODE 5
30 VDU 24,200;300;1000;800;
40 VDU 19,0,5,0,0,0
50 VDU 19,3,4,0,0,0
60 count=0
70 REPEAT
80 count=count+1
90 MOVE 0,0
100 x=RND(1279):y=RND(1023)
110 GCOL0,RND(3)
120 DRAWx,y
130 UNTIL count>99
```

Program I

Line 30 defines a graphics window, illustrated in Figure I. Only the graphics within this window are displayed. To see the full sunburst effect of the program try leaving out line 30.

Incidentally, line 20 and 30 have to

By PAUL JONES

be in that order. Changing modes destroys any graphics or text windows, so these must be defined after you change.

We could make sure the beginning of our sunburst fits into the graphics window by MOVEing to its bottom left hand corner each time before we DRAW. That is, we could change line 90 to:

```
90 MOVE 200,300
```

There is a neater way. Simply tell the micro that, from now on, it is to con-

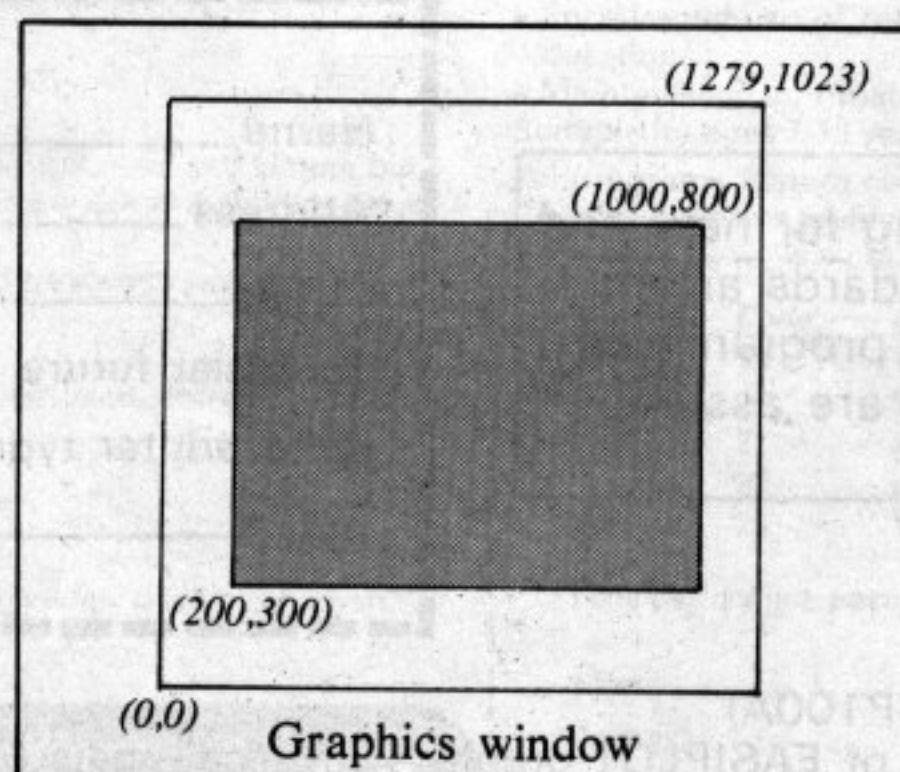


Figure I

sider the point (0,0) – called the origin – to be at the bottom left of the graphics display.

We do this with the VDU 29 command. This allows us to place the origin at any point on the display. For instance:

```
VDU 29,640;512;
```

places the origin at the centre of the screen. This means that from now on (0,0) will refer to the middle of the screen.

Try:

```
MODE 5
VDU 29,640;512;
MOVE 0,0
DRAW 200,200
DRAW 200,0
DRAW 0,0
```

to prove that, as far as the micro is concerned, (0,0) has been moved to the centre of the screen.

Notice how we use the command to move the origin:

- VDU 29 followed by a comma
- the X co-ordinate followed by a semicolon
- the Y co-ordinate followed by another semicolon.

Make sure you get your commas and semicolons in the right places!

In Program II line 40 ensures that the origin is moved to (200,300), which

```
10 REM PROGRAM II
20 MODE 5
30 VDU 24,200;300;1000;800;
40 VDU 29,200;300;
50 VDU 19,0,5,0,0,0
60 VDU 19,3,4,0,0,0
70 count=0
80 REPEAT
90 count=count+1
100 MOVE 0,0
110 x=RND(1279):y=RND(1023)
120 GCOL0,RND(3)
130 DRAWx,y
140 UNTIL count>99
```

Program II

is at the bottom left hand corner of the graphics window defined in line 30.

This ensures that the sunburst starts at the bottom of the window. The MOVE (0,0) of line 100 makes certain that the DRAW of line 120 starts from there.

Moving the origin in this way is more formally known as "redefining the graphics origin". You can use this idea of redefining the origin without using a graphics window – though you often do, since they work quite nicely together. Look at Program III.

Line 30 moves the origin to the centre of the screen. Although we haven't defined a window here, you

might think that we are restricted to the top right hand corner of the screen because of the position of the origin.

We can use the rest of the screen, though, if we use negative co-ordinates. These involve using numbers smaller

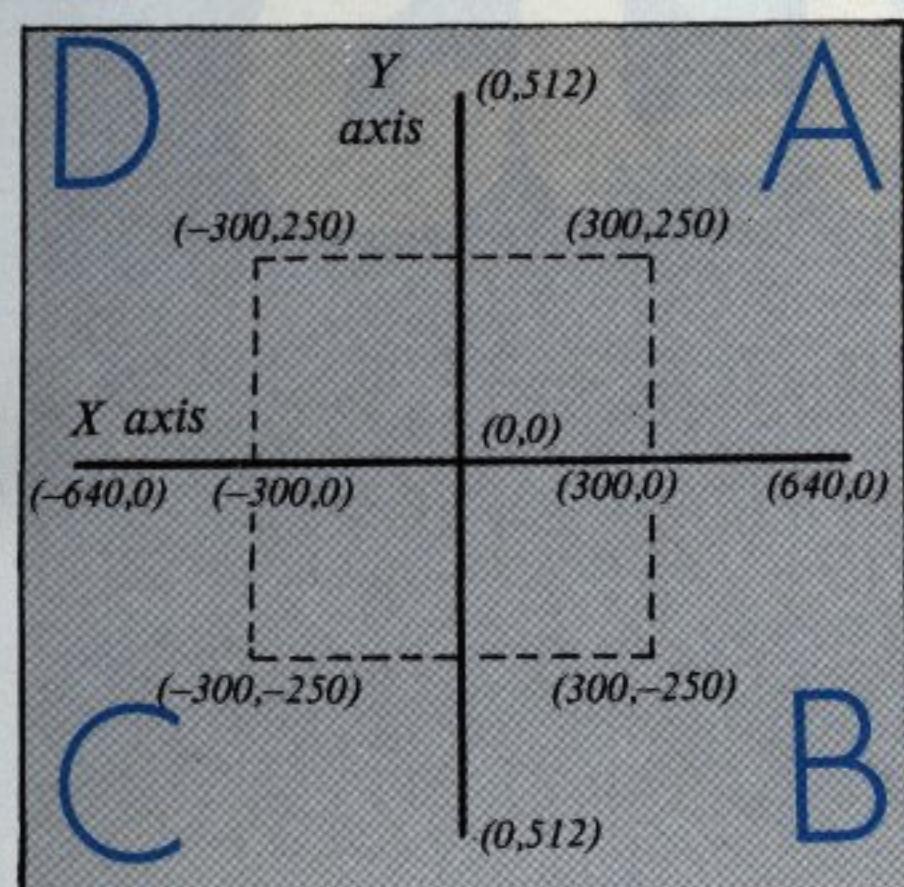


Figure II

than 0, that is, numbers with a minus ('-') sign in front of them.

So far we have just used positive co-ordinates, which are numbers bigger than or equal to zero. Figure II illustrates the idea.

If both co-ordinates are positive, the point will be in region A. If the X co-ordinate is positive and the Y co-ordinate negative, it is in region B.

If both co-ordinates are negative the point is in region C, while if the X is negative and the Y positive it will be in region D.

Notice that as you go left along the X axis from the origin the figure following the minus sign increases. That is, -300 is nearer to the origin than -600.

Similarly, as you move down the Y axis from the origin, -250 is nearer to the origin than -500.

Try running program III with the following versions of line 100:

```
100 x=RND(640):y=-RND(512)
100 x=-RND(640):y=-RND(512)
100 x=-RND(640):y=RND(512)
```

Each version will draw our sunburst at different corners of the screen.

```
10 REM PROGRAM III
20 MODE 5
30 VDU 29,640;512;
40 VDU 19,0,5,0,0,0
50 VDU 19,3,4,0,0,0
60 count=0
70 REPEAT
80 count=count+1
90 MOVE 0,0
100 x=RND(640):y=RND(512)
110 GCOL0,RND(3)
120 DRAWx,y
130 UNTIL count>99
```

Program III



Program IV uses the idea of negative co-ordinates to produce a full sunburst effect.

Program V uses a procedure, PROCburst, to give the sunburst effect. PROCburst is defined to allow us to choose the position of the origin (xpos,ypos) and the maximum size of line.

Variables x and y are then chosen and used in the four combinations of negative and positive (lines 130 to 170). This gives the sunburst – this time of

```
10 REM PROGRAM IV
20 MODE 5
30 VDU 29,640;512;
40 VDU 19,0,5,0,0,0
50 VDU 19,3,4,0,0,0
60 count=0
70 REPEAT
80 count=count+1
90 GCOL0,RND(3)
100 x=RND(640):y=RND(512)
110 MOVE 0,0:DRAW x,y
120 x=RND(640):y=-RND(512)
130 MOVE 0,0:DRAW x,y
140 x=-RND(640):y=-RND(512)
150 MOVE 0,0:DRAW x,y
160 x=-RND(640):y=RND(512)
170 MOVE 0,0:DRAW x,y
180 UNTIL count>99
```

Program IV

one colour – a pleasing symmetry.

The procedure is called three times. The value of xpos is determined by the variable parameter, as is the maximum line length.

The value of ypos is actually fixed at 512. If you like, you can replace the 512 in line 70 with 512/2^count, which moves each successive sunburst down the screen.

```
10 REM PROGRAM V
20 MODE 5
30 VDU 19,0,5,0,0,0:VDU 19,3,4,0,0,0
40 FOR count= 0 TO 2
50 parameter=1100/(2^count)
60 GCOL0,count+1
70 PROCburst(parameter,512,parameter)
80 NEXT count
90 END
100 DEFPROCburst(xpos,ypos,size)
110 VDU 29,xpos;ypos;
120 FOR loop=0 TO 50
130 x=RND(size):y=RND(size)
140 MOVE 0,0:DRAW x,y
150 MOVE 0,0:DRAW x,-y
160 MOVE 0,0:DRAW -x,-y
170 MOVE 0,0:DRAW -x,y
180 NEXT loop
190 ENDPROC
```

Program V

SPACE PODS

By NICOLAS TIMBERLAKE



Guide to Software for the BBC Micro

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Memo Calc	A database program with up to 255 columns of any width. Calculations and full sorts.	●		●	●	£11.45	£9.95	Micro Aid
Metrics	Five programs giving practice in metric system, mass, capacity, length, volume, area. Interactive.	●		●	●		£9.95	Chalksoft
Microbial Pop. Dynamics	Biology. Simulation of prey predator model by solving growth equations. Plots changes in population	●		●	●	£9.50	£7	Microwave NW
Mitosis	Revision program. Shows events in mitosis. Question sections. For biology courses.	●		●	●		£15	Garland

Education section to be continued next month

Programs featured in this Guide are supplied by:

BAKsoft, 34 Humberstone Road, Cambridge; **BBC Micro User**, Europa House, 68 Chester Road, Hazel Grove, Stockport; **Bourne** Educational Software, Bedford Lane, Headbourne Worthy, Winchester, Hants; **Busco**, 16 Colwill Walk, Mainstone, Plymouth; **Carvels**, 3/7 Bank Street, Rugby; **CUP** (Cambridge University Press), Edinburgh Building, Shaftesbury Road, Cambridge; **CPE** (Central Program Exchange), The Polytechnic, Wolverhampton; **Chalksoft**, Lowmoor Cottage, Tonedale, Wellington, Somerset; **Clares** Micro Supplies, Providence House, 222 Townfields Road, Winsford, Cheshire; **CMS** (Computer and Media Services), Sherwood, Woodhouse Lane, Holmbury St. Mary, Dorking, Surrey; **Computer Concepts**, 16 Wayside, Chipperfield, Herts; **Computercat**, 224 Chapel Street, Leigh, Lancs; **Corona** Software, 73 High Road, S. Woodford, London; **Cottage** Software, Heather Cottage, Selly Hill, Whitby, N. Yorkshire; **Contex** Computing, 15 Woodlands Close, Cople, Bedford; **DACC**, 23 Waverley Road, Hindley, Lancs; **Database** 27 City Road, Stoke, Staffs; **Dial** Software, 72 Dowlend Road, Dowlend, Bristol; **Digital Fantasia**, 24 Norbreck Road, Norbreck, Blackpool; **Electronics Applied**, 4 Dromore Road, Carrickfergus, Co. Antrim; **FBC** Systems, 10 Castlefields, Main Centre, Derby; **Focusplan**, Focus House, 57 Westgate, Cleckheaton, W. Yorks; **Gaelsett** Software, 44 Exeter Close, Stevenage, Herts; **Garland** Computing, 35 Dean Hill, Plymouth, Devon; **GEM** Software, 1 Oswald Road, Leamington Spa; **GJ Associates**, 35 Donovan Avenue, London; **Golem**, 77 Qualitax, Bracknell, Berks; **Griffin & George**, 285 Ealing Road, Alperton, Wembley, Middlesex; **GT Software**, 8 Bull Street, Potton, Sandy, Beds; **H & H** Software, 53 Holloway, Runcorn, Cheshire; **J. Hargreaves**, Updown, Pewley Way, Guildford, Surrey; **Heinemann** Computers in Education, 22 Bedford Square, London; **Simon W. Hessel** Software, 15 Lytham Court, Cardwell Crescent, Sunninghill, Berks; **Hexagon** Software, 17 Straits Road, Gornal, Dudley, West Midlands; **Hopesoft**, Hope Cottage, Winterbourne, Newbury, Berks; **IJK** Software, 9 King Street, Blackpool, Lancs; **Kosmos** Software, 1 Pilgrims Close, Harlington, Dunstable, Beds; **Level 9** Computing, 229 Hughenden Road, High Wycombe, Bucks; **Logic** Systems, 85 Hemingford Road, Cambridge; **Longman** Group,

Longman House, Burnt Mill, Harlow, Essex; **David McKeran**, 23 Warwick Drive, East Herrington, Sunderland, Tyne & Wear; **Mayday** Software, 181 Portland Crescent, Stanmore, Middx. HA7 1LR. **MGB** Software Support, 52 Barley Croft, Harlow, Essex; **Micro-Aid**, 25 Fore Street, Praze, Camborne, Cornwall; **Micro-Jenn** Software, 81 Squirrels Heath Road, Harold Wood, Essex; **Micromode**, 32 West End Avenue, Gatley, Ches; **Microplus** Software, 6 Litton Way, Leeds; **Micro Power**, 8/8a Regent Street, Chapel Allerton, Leeds; **Microwave NW**, 24 Belford Road, Stretford, Manchester; **MP Software**, 165 Spitai Road, Bromborough, Wirral, Merseyside; **NEC** (National Extension College), 18 Brooklands Avenue, Cambridge; **Ordura** Consultants, PO Box 179, Sheffield; **Paean** Systems, Wuebec House, Little Bealings, Woodbridge, Suffolk; **Primasoft**, 2 Spinney Close, Glossop, Derby; **Pro Software**, 121 Tyn-y-Twr, Baglan, Port Talbot, West Glam; **Processor** Applications, 22 Mercer Close, Basingstoke, Hants; **RMK** Electronics, Hinton House, Station Road, New Milton, Hants; **Ross** Software, 44 Premier Avenue, Grays, Essex; **Salamander** Software, 27 Ditchling Rise, Brighton, Sussex; **Schoolsoft**, 19 Shadwell Grove, Radcliffe-on-Trent, Nottingham; **Secta** Software, 14 Bracadale Close, West Coombe Park, Coventry; **Simonsoft**, Front Street, Topcliffe, N. Yorks; **Smash Hit** Software, 11 Calfridus Way, Bracknell, Berks; **Softefex**, 11 All Saints Road, Creeping, St. May, Ipswich; **Software Invasion**, 50 Elborough Street, Southfields, London; **Square** Software, 12a Uplands Terrace, Swansea, W. Glamorgan; **Squirrel** Software, 4 Bindloss Avenue, Eccles, Manchester; **Stable** Software, Compton Street, Compton, Nr Winchester, Hants; **Superior** Software, 69 Leeds Road, Bramhope, Leeds; **Zero** Software, 29 St. Michaels Close, North Walthams, Basingstoke, Hants.

Part 3 of the Guide to Software for the BBC Micro will appear in the August issue of The Micro User. It will include many more games and educational programs, together with some of the very latest summer releases.

While every care has been taken in compiling details for this Guide, no responsibility can be accepted for any errors or omissions.

GAMES

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Games Compendium B1	Family educational compendium of four games. Alphabet Soup. Simon, Fireman and Hangman.	●		●	●		£6.95	Salamander
Games Compendium B3	Three family games. Mole, Boothill and Bomber.	●		●	●		£6.95	Salamander
Games Pack 1	Three games for a BBC Model B. Ski run, Mastermind, Road Race.	●	●	●	●		£4.95	Logic Systems
Games of Logic, Cunning	For children and adults. Includes Auction, Flip, Reverse, Telepathy, Hexa:15.	●	●	●	●	£12.65	£9.20	Golem
Games, Tape 1	Three colourful fun games. Snake, Breakout and Hunt	●	●	●	●		£7.95	Pro Software
Gamespack 1	Three games. Tron, Life and Cubic.		●		●		£5.95	Processor Applications
Gamespack 2	Three games. Multimaze, Catch and Bomber.		●		●		£5.95	Processor Applications
Glooper	Hunt the ghosts and be hunted.		●	●	●		£6.95	Microplus
Gobbler	Arcade style Pacman type game featuring power pills and bonuses.		●	●	●		£5.45	MGB
Golf	An 18 hole golf course in your home.		●		●		£4.95	Microplus
Grand Prix	Drive your car round the circuit.	●	●	●	●		£4.25	Microplus
Great Britain Ltd	You are PM and Chancellor of Great Britain. Try to run the country successfully.		●		●	£10.95	£5.95	Hessel
Gridrunner	Machine coded arcade game, zapping alien gridsearch squads.		●	●	●		£7.95	Salamander

Continued from last month

Fold

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Grig Blitz	A fast action arcade type game. 10 play levels of increasing difficulty.	●			●		£5.95	Computercat
Gunsmoke	Wild West shanty town shootout. More like an animated cartoon than a computer game.		●				£7.95	Software Invasion
Hangdroid	A new version of the old Hangman.	●			●		£4.99	Micromode
Hangman	Word game with three levels of play against the clock. Vocabulary of over 500 words.		●				£4	MP Software
Hitch Hiker	A fun adventure game based around characters from the popular book and TV series.		●		●		£7.80	Computer Concepts
Hyperdrive	Addictive machine code arcade game. Guide your laser tank while destroying drone aliens.	●			●		£6.50	IJK Software
Inheritance	A two part game. Gain your inheritance in Part I. Run the Paradise Cola Co in Part II.		●		●		£5.95	Hessel
Invaders	Arcade quality full feature Space Invader game in machine code using Mode 1 colour graphics.	●	●		●		£6.95	Software Invasion
Invaders	Fast, colourful version of the game, with 64 aliens and 8 speeds. Mode 2 graphics. Machine code.	●			●		£6.50	MP Software
Invaders	The old classic brought up to date with two types of bomb dropping ships and crumbling defences.		●					
Katakombs	Adventure type game.	●			●	£11.95 £12.65	£7.95 £9.20	Superior Golem
King Kong	Fast moving game in which you pilot a helicopter to rescue girls from the Empire State Building before killing Kong.	●			●		£3.75	BBC Micro User
Kong	A new version of the popular arcade game, with barrels, ladders and Kong himself.	●			●			FBC
L Trap	Strategy game to develop spatial awareness. Eight levels of play. Two players or against the micro.	●			●	£11	£8.50	Gem
Landfall and Serpent	Landfall is a powered descent simulator. Serpent is a frantic maze game.	●			●		£6.50	GT Software
Laser Zone	Zap the aliens, controlling two laser bases simultaneously. Fast and furious game.	●	●		●		£7.95	Salamander
Leap Frog	Machine code version of the game. Features frog eating parrots, butterflies. Many tunes.		●	●			£7.50	IJK Software
Life Plus	Ultra fast version of the game of Life. Turtle graphics commands to set up colonies.	●	●		●		£4.49	Mayday
Link 4 Plus	Fast, challenging, advanced 4 in line game for 1 or 2 players.	●	●		●		£6.95	ABC Software
Mastermind	A game to test the logic and mental processes to compete agaisn the computer and crack the codes.	●			●		£4.54	Micro Power
Maze invaders	Four aliens hide in a maze. Navigate your missile to destroy them. Three speeds.	●			●		£5.69	Micro Power

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Hangman	The classic word guessing game but in five languages, English, French, Italian, German and Spanish.	●			●	£9.45	£7.95	Micro Aid
Hangman Player	Produces a Hangman game from words or phrases typed in by the user.	●	●		●	£10	£7	Square
Human Blood Groups	Simulation and explanation of experiments to determine blood group of an individual.	●			●		£15	Garland
Hydraulics	This is an education program aimed at pupils of 14 plus. Teaches flow, volume, etc.	●			●		£5.50	Database
Inheritance	Four programs simulating experiments in Mendelian genetics.	●			●		£30	Garl
Inkosi	Be an African king. Interactive simulation which stimulates strategic thinking and discussion.	●			●		£5.95	Chalksoft
Introducing Map Skills, 1	Two programs dealing with elementary mapping skills. Grid references and scales.	●				£18	£18	CUP
Introducing Map Skills, 2	Two programs dealing with elementary mapping skills. Compass points and bearings and yacht race.	●				£18	£18	CUP
Invisible Man	Draws and labels a 10x15 grid. Hides a large cartoon man. Find him by keying in coordinates.	●			●		£5.95	Chalksoft
Janeplus	Program encourages children to discuss the idea of simple mathematical functions.	●			●		£14.50	Longman
Jumbo	Make as many words as possible from the word Elephant.	●			●			Central
Junior Hangman Player	Lower case only version of Square Softwares Hangman Player.	●	●		●	£10	£7	Square
Junior Maths	Three fun programs to teach simple calculations. For ages 5 to 11. Helps develop logical thinking.	●			●		£6.84	Micro Power
Kidney	Simulation of homeostatic control in kidney function. Visual aid for learning anatomy.	●			●		£12	Garland
Letters	Five programs that draw screen size lower case letters. Age 4 to rehabilitation adult.	●			●		£9.95	Chalksoft
Logo 2	An introduction to the turtle graphics of the Logo language, used extensively in education.	●			●		£10	Computer Concepts
Longitudinal Waves	A dynamic model demonstrating wave motion. User can control variables to investigate properties.	●			●	£12.50	£12.50	Heinemann
Mark Book	A mark book program for up to 40 pupils and 10 subjects.	●	●		●		£5	Carvells
Maths Topics, 1	Two programs to help secondary school pupils with key areas of maths, Symmetry and Vectors	●				£18	£18	CUP
Maths Translations	Explains how to do mathematical translations using a grid, with matrix calculations.	●			●	£9	£5	Corona

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Flags	Flags of the world drawn in hi-res colour graphics. Program tests your knowledge of geography.	●	●		●		£4.50	IJK Software
Flanders	For the teacher who uses the Flanders Interaction Analysis for self-assessment.	●	●	●	●	£9.95	£7.95	Focusplan
Fractions	Four programs to help children with fractions.	●	●		●		£7	Garland
French Mistress, 1	Fully programmable language tutor. Colourful lessons provide a comprehensive vocabulary.	●	●		●		£8.95	Kosmos
French Mistress, 2	Contains supplementary vocabulary. Additional lessons can be created on tape.	●	●		●		£8.95	Kosmos
French Vocabulary	Aids learning and revision of French with help of puzzles. Starts with 800 words, can be increased.	●	●		●		£6.50	Hargreaves
Fun with Words	Includes Alpha, Vowels, There, Suffixes and Hangman.	●	●	●	●	£11.50	£8.05	Golem
Fun/Sums	Additive educational program combining graded arithmetic questions with the game of battleships.	●	●		●		£4.95	Kosmos
GB Geography	User selected maps of GB and Ireland showing countries, areas, major cities, etc.	●	●	●	●	£9.95	£6.95	Primasoft
Gasgus	Chemistry. Identification of gases by various tests.	●	●		●			Central
Genetic Code - Mutation	Shows transcription, translation, triplet code, various types of mutation.	●	●	●	●		£15	Garland
Geography, France	Maps show rivers, towns, seas, mountains. Menu driven. Good use of graphics, colour and sound.	●	●		●	£9	£5	Corona
Geography, Germany	Shows flag with national anthem. Displays maps with towns, seas and mountains, with tests.	●	●	●	●	£9	£5	Corona
Geography, Italy	Maps show seas, rivers, towns, mountains and regions. Describes other factors concerning economics.	●	●		●	£9		Corona
Geogtest	General knowledge - geography. Capital cities.		●	●				Central
Getset	Two programs introducing number bond work in open-ended way, using the idea of sets.	●	●		●			Griffin and George
Glycolysis - TCA Cycle	Animated graphics show molecular changes, role of enzymes, etc.	●	●	●	●		£15	Garland
Graph Capers, Junior	Includes Plot Shot, for learning point plotting, and Gradients, for understanding slope of a line.	●	●		●	£1	£7.50	Gem
Graph Capers, Senior	Includes Functions, for aiding exploration of graphs, and Plotter, for designing graphs.	●	●		●	£11	£8.50	Gem
HTU	Maths. Place value	●	●		●			Central

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Middle Kingdom	Retrieve ten lost treasures in this exciting adventure program.	●	●		●		£7.95	Pro Software
Mission Vadros	First of a series of space adventures where you are sent on various missions against the Vaders.		●		●			FBC
Model A Invaders	Full feature machine code teletext colour graphics version of Space Invaders. Fast, smooth and fun.	●	●		●		£5.50	IJK Software

Games section to be continued next month

UTILITIES

Banner	Enables large banners to be printed onto paper up to any length or size.	●	●		●	£4.45	£2.95	Micro Aid
Basic Goodies	A set of useful Basic debugging and teaching programs.	●	●			£8.95	£5.95	Simonsoft
Beebon Mon	Full machine code monitor display, alter registers, disassemble, fill, hunt, and other features.	●	●		●		£2	McKeran
Blackjack, Textpro	Blackjack is just like the arcade game. Textpro is simple word processor. Plus disassembler.		●				£6.95	Software Invasion
Character Shapemaker	For designing a shape using combinations of redesigned characters	●	●		●	£10	£7	Square
Character generator	An aid for redefining the character set. Completed characters can be saved on tape for future use.		●				£3	MP Software
Chargen	For easy setting up of user definable characters, saving them on tape or on function keys.	●	●		●		£3.95	Busco
DOS Utilities	Formats and verifies 40 or 80 track discs. Allows use of cheaper drives than the BBCs own.	●	●		●	£15		Focusplan
Deebug ROM	Machine code monitor including single step, setting breakpoints, etc. ROM only at £19		●					Computer Concepts
Disassembler	Relocatable disassembler program. Lists object code and mnemonics from and to specified addresses.	●	●		●		£6.84	Micro Power
Disassembler	A fully interactive, multi feature disassembler.	●	●		●	£9.95	£6.95	Simonsoft
Disk Doctor	A full editor for discs, allowing recovery of damaged files, etc, plus utilities. ROM only at £19.		●		●			Computer Concepts
Disk Utilities I	Enhances the DFS utilities. Includes format, verify, merge, duplicate, free space analysis, etc	●	●		●	£12.95	MGB	
Disk Utilities II	Includes menu, duplicate, free space analysis, merge, file create and relocater.	●	●		●	£9.95		MGB
Dmove	A disc utility to adapt programs originally on tape to disc use, both Basic and machine code.		●		●			FBC
Emulator	A machine code interpreter, fully compatible with Disassembler.	●	●		●	£9.95	£6.95	Simonsoft

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Envelope and Ch. Definer	Enables accurate definition of envelope parameters and speeds character design. Two programs.		●		●		£5.50	Electronics Applied
Ext. Col. Fill Graphics	Machine code extension to OS giving increased range of area fill colours in all plotting modes.	●	●	●	●		£10	Gaelsett
FX Print	Pack of printer driver routines for Epson FX80.		●		●		£11	Processor Applications
Frame Up	Displays pages downloaded from Micronet 800. Features sequencing, hold, select page and tiling.	●			●	£7.95		MGB
GP Copy	A screen copy utility in machine code for Selkosh printers		●				£3.95	Logic Systems
Index	Utility for authors to create index as book is written. Also for readers of unindexed books.		●		●	£8.50	£6	Microwave NW
Labelmaker	For printing a sheet of labels using an Epson printer.	●	●		●	£10	£7	Square
MX Copy	A comprehensive copy utility for MX80 III, RX80 and FX 80 Epson printers.		●				£4.95	Logic Systems
Monitor	Machine monitor program enables on screen monitoring and changes. Register displayed, memory moved.	●	●		●	£9.95	£6.95	Primasoft
Multigen	A character generator allowing multiple characters to be created on screen.		●		●		£4.99	Micromode
Printer Toolkit	Fast shaded screen dumps for NEC and Epson printers, direct disc spooling, etc. ROM only at £19.		●		●			Computer Concepts
Pro Dis	RAM resident colour disassemble, dump, edit program with COPY and FIND functions.	●	●		●	£9.95	£7.95	Focusplan
Synthesiser	Allows up to 16 envelopes to be defined and saved.		●		●	£10.95	£7.95	Clares
Synthesiser	Allows easy setting up and editing of envelopes and sound channels.	●	●		●		£8.95	Busco
Teletext Shapemaker	For designing a shape built of teletext characters.		●		●	£10	£7	Square
The Key	Allows copying or writing to individual sectors or tracks on disc. Will backup many protected discs		●		●	£12.95		Clares
Toolkit	Comprehensive programmers aid including full documentation. Disassembler, breakpoint routine, etc.		●				£8.95	Logic Systems
Toolkit	Contains powerful Disassembler, Graphics Design Pad and Variables List.	●	●		●		£6.50	Squirrel
Utilities	Assortment of procedures and functions. Date conversion, input and validation, routines, sorts, etc	●	●		●	£11.50	£8.05	Golem
Utilities	Character and sound generators		●		●		£3.50	Microplus
Utilities 1	Allows teletext style pages to be quickly constructed. Plus VTR titler and phone call cost monitor.	●	●		●		£6.99	Softrefex
Utilities Package	Four essential programming aids. Soundshape, EDG Epson printer dump, Teletext editor, Disassembler.	●	●				£9.95	Salamander

Fold

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
							Cassette	
Utility A	Includes 7 programs to search and alter a Basic program, list variables, define characters, sort.	●	●		●	£7.45	£5.95	Micro Aid
Utility Pac	Programs and routines include Sort, Alphab, Calender and Input.	●	●		●	£9.95	£5.95	Focusplan
Utility Pack 1	Recover from bad program, Remove spaces and REMs from Basic program, plus alarm clock.	●	●				£5.95	Processor Applications
Xtender	A means of storing up to 116 user files on each BBC disc surface.	●	●		●		£5	BAKsoft

LANGUAGES

Forth Toolkit	Adds a full assembler, turtle graphics, locating words, decompiler words, cassette file handling.	●	●	●	●		£10	Level 9
rq Forth	A standard compiler for cassette and disc use. Includes 70p manual, 16p supplement and summary card	●	●		●		£15	Level 9

DOMESTIC

Astrol	Horoscope birth chart calculator giving planetary positions, houses, aspects and other data	●					£8.95	G.J. Associates
Cookbook	A suite of 38 recipes covering starters, casseroles, main meals, etc.		●		●		£7.50	Database
Finance Pack 1	Calculation of loan payments, cheque and cash balancer, card index program.		●		●		£5.95	Processor Applications
Football Pools Predictor	Powerful mathematical and statistical forecasting program using 6 different methods of prediction.	●	●		●		£4.99	Mayday
Fuel Monitor	Monitors fuel consumption of motor vehicles in terms of MPG. Includes complete data file editor.		●		●		£9.50	Oraura
Home Finance	5 programs. Mortgage calculator, loan scheduler, interest calculator, annuity calculator, calendar.	●	●		●		£6.50	Microplus

EDUCATION

Eye	Two programs which demonstrate how the eye works by plotting the path of light from an object.	●			●		£14.50	Longman
Factfile	3 programs showing computer acting as information store, stimulating children's imagination.	●				£18	£18	CUP
Female Reproductive Cycle	Colour graphics show events in female cycle and fertilisation. Hormones.	●	●		●		£12	Garland
Fizzbuzz	Educational game using simple maths.	●			●			Central
Flags	98 flags displayed with four questions about each. Helps teachers make geography interesting.	●			●	£5.45	£3.95	Micro Aid

Continued from last month



Join the battle for survival...on far off Tau Theta

YOU are tired but you must continue. For hours the battle has been raging and still the aliens press home their attacks.

As commander of the Federation Fleet your mission is to protect the underground base on Tau Theta. The aliens are dropping robot space pods that burrow into the planet's surface.

Were they to reach it and discover its scientific secrets the whole universe would fall to their onslaught.

Despite fighting desperately, your battle fleet has been destroyed. The

aliens' space pods have proved to be almost invincible.

You have found refuge on one of two stationary satellites far above the surface of Tau Theta. Your last hope is the laser cannon based on the satellites, but their computer guidance has been destroyed.

You will have to fire the cannons manually. But the space pods continue coming and it's getting harder to keep them at bay.

How long will you be able to survive?

Space Pods listing starts on Page 104

BITS & BYTES

Consider

As we have mentioned in previous articles, the BBC Micro – and all other machines based on the 6502 micro-processor – handles its binary numbers in groups of eight bits at a time. Such a group of eight is called a byte.

However, while handling eight bits at a time is satisfactory from the machine's point of view, from the human side of things it's rather difficult to manage. Those 1s and 0s are far too prone to error. Look at Table I for instance. It contains an error – can you find it?

It's all too easy to slip up when handling binary numbers – a single 1 in the wrong place and all is lost! To make things easier to deal with, when I am copying out binary numbers I put a wavy line between bits 3 and 4 to split the byte into two equal groups of four.

For example, if I were copying

% 10001111 (= 1 4 3)

I would write

% 1000{1111

Actually, splitting the byte into two groups of four bits is standard practice – each group of four bits is called a “nibble”, would you believe.

It's not too hard to see that the biggest number you can represent in a nibble is 15, and the smallest is 0,

%1111 and % 0000

respectively. After all, you've only got four bits to play with!

So we can split up our byte into two nibbles of four bits each. Now when we split up a binary number in this manner we call the “left-hand” nibble the most significant nibble (MSN) and the “right hand nibble” the least significant nibble (LSN).

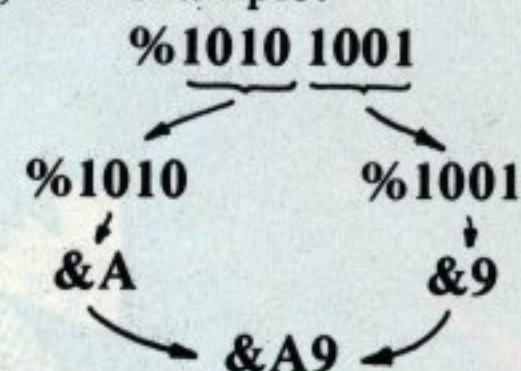
We have already created one new number system – the binary system. Let's design another one that combines the advantages of the denary system

with those of the binary. That is, it will be easy to read and write, yet will still allow us to perceive the binary manner in which the machine handles things.

The system we want is called hexadecimal. This consists of using our standard digits 0 to 9 for the number zero to nine respectively, and the letter A to F for the numbers 10 to 15. In this way it allows us to code the numbers available in a nibble (that is, 0 to 15) with just one digit. This digit will be in the range 0 to 9 or A to F.

It may take a while to adjust to the

a byte as two hexadecimal digits side by side, for example:



That is:

%10101001 = &A9 = 169

You just split the byte up into two nibbles – a left hand and a right hand nibble, encode each as a hexadecimal number, then put the two side by side.

MIKE BIBBY continues his explanation of the fundamentals of the BBC Micro workings

idea of using letters of the alphabet for numbers, but it soon becomes second nature. You just have to get used to counting

1,2,3,4,5,6,7,8,9,A,B,C,D,E,F

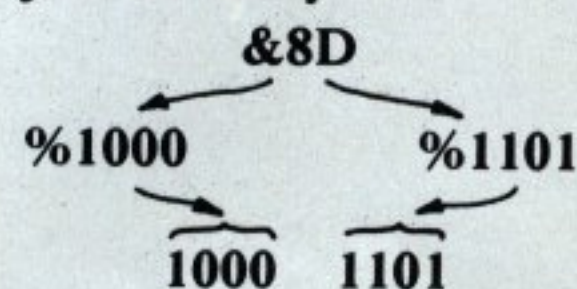
Remember, there are B people in a cricket team, D in a rugby league team and F in a rugby union team. There are C months in a year, and E days in a fortnight.

Now just as we prefix all our binary numbers with %, we prefix our hexadecimal numbers with &, to avoid confusion. So &F means 15, while &9 means 9.

Studying Table II will really pay dividends – I suggest you practise writing down bit patterns of nibbles and their hexadecimal equivalents until it becomes second nature.

Given that we can encode a nibble in one hexadecimal digit, and that a byte consists of two nibbles, it should readily be apparent that we can encode

You can go from hexadecimal to binary just as easily:



That is:

&8D = % 10001101 = 141

Although you have probably never thought of it in these terms, you are well aware that the value a digit represents depends on the column it is in. The number 230 is not as large as 320, though both numbers contain the same digits.

In hexadecimal coding too the column a digit is in is important. For example, &10 is far greater than &01. In binary each column is worth twice the preceding one. In denary, our usual number system, each column is worth 10 times the preceding one. In hexadecimal, each column is worth 16

the significance of nibbles...

times the preceding one.

Believe or not, the columns in a four digit hexadecimal number, from greatest to least, are worth:

4096, 256, 16 and 1 respectively.

This means that:

$\&1101 = 4096 + 256 + 1 = 4353$

For the moment let's concentrate on the two digit, that is, two column, hexadecimal number, as these are all we need to store our bytes in. In this case the left-hand column is the "sixteens" column, the right hand the units column.

So:

16 1
 $\&21 = 2 \times 16 + 1 = 33$
 16 1
 $\&2D = 2 \times 16 + 13 = 45$
 16 1
 $\&80 = 8 \times 16 + 0 = 128$
 16 1
 $\&C0 = 12 \times 16 + 0 = 192$

To translate a two digit hexadecimal number into denary simply multiply the number in the left-hand column by 16 and add it to the number in the right-hand column – remembering to translate A to F if necessary.

The second column has the value 16 since the first column can only handle numbers up to 15 (&F) – the largest you can fit into a nibble (%1111). After 15, you *have* to use a second column for 16, that is &10.

Just as in denary, we "carry" at 10 since the largest value our columns can handle is 9, so in hexadecimal we carry

%10111011 = 187
%10101101 = 173
%10001111 = 151
%11110110 = 246

Table I

at 16, since the largest value our columns can handle is 15 (&F).

It is the fact that we carry at 16 that gives this number system its name "hexadecimal" – here "hex" stands for 6, "decimal" for ten. "Hexadecimal" = $6 + 10 = 16$.

Given a second column, &10, as we have seen is 16, 17 will be &11, while &12 is 18 and so on until we reach 31, which is &1F.

We have then run out of legal digits for the units column, so if we want to go on to 32 we had better give ourselves another 16, and set the units column back to zero, that is &20.

Another way of looking at the second column is that it comes from the most significant nibble. To turn the least significant nibble into the most significant nibble, we have to shift it over to the left four times.

If you cast your mind back to last month, this is equivalent to multiplying it by two four times in succession, that is $2 \times 2 \times 2 \times 2 = 16$. This is why a hexadecimal digit representing the most significant nibble is 16 times larger than the same digit representing the least significant nibble.

The largest number you can store in a two-digit hexadecimal number is

&FF = $15 \times 16 + 15 = 255$. This is, of course, the same as the largest number we could store in a binary byte – we often refer to a two digit hexadecimal number simply as a byte.

To obtain the hexadecimal equivalent of a positive integer (whole number) less than 256, we divide it by 16. The quotient is the left hand digit, the remainder the right hand, translating into A to F where necessary.

For example:

$174 \div 16 = 10 \text{ r } 14$

That is:

$\&A \text{ r } \&E$

Hence $174 = \&AE$

Fortunately we don't have to go to such lengths, the BBC Micro allows us to simply print out the hexadecimal equivalent of decimal numbers and vice versa.

For instance:

P. &BC will give
192

while P. ~141 will give
&8D

(Notice that ~ in Mode 7 appears as ÷. Don't worry, it still works.)

Decimal	Binary	Hexadecimal
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

Table II

BBC MICRO OFFERS FROM OPUS

WE HAVE MOVED TO LARGER PREMISES
Please note our new address and telephone number

TEAC DISC DRIVES

- TEAC 55F 5¼" D/S 80 Track. Formatted Single Density 400K. ONLY £229.00
- Case with built in power supply to hold 2 drives. ONLY £39.95
- If case bought without drives £45.00
- Ribbon Lead £12. ● Power Lead £5.00
- Ideal for use with BBC Micro.
- Slimline – latest technology.
- Low power consumption. ● Full warranty.
- Switchable 80/40 Track.

CANON DISC DRIVES

- MDD 6106 5¼" S/S 40 Track. Formatted Single Density 100K. ONLY £129.00**
- Case £9.95. ● Leads available. Prices as TEAC.
 - Ideal for use with BBC Micro.
 - Full warranty. ● Slim design.

A DAISY WHEEL PRINTER ONLY £499

TEC STARWRITER FP 1500-25
25 CPS – Friction Feed – Serial Interface
Interface Lead to connect to your BBC £9.00

12" GREEN SCREEN MONITOR

- Video input response 18Mhz. ● 12 month warranty.
- Composite video/phono connector. ● ONLY £69.95
- European manufacture.

FLOPPY DISCS

5¼" Discs – with Hub Rings in FREE Plastic Library Case.
"Nashua" – 5 Year Guarantee.

S/S 40 Track	£16.95 for 10
D/S 40 Track	£22.95 for 10
S/S 80 Track	£25.95 for 10
D/S 80 Track	£26.95 for 10

How to order:- Add carriage at the following rates – Discs 85p. Game, Free. All other goods £7.00
Add VAT at 15% to the total.

Govt, Educational & Official orders welcome.

BRAND
NEW

14" Cased R.G.B. COLOUR MONITOR

SCOOP

Medium Resolution **£199.00**

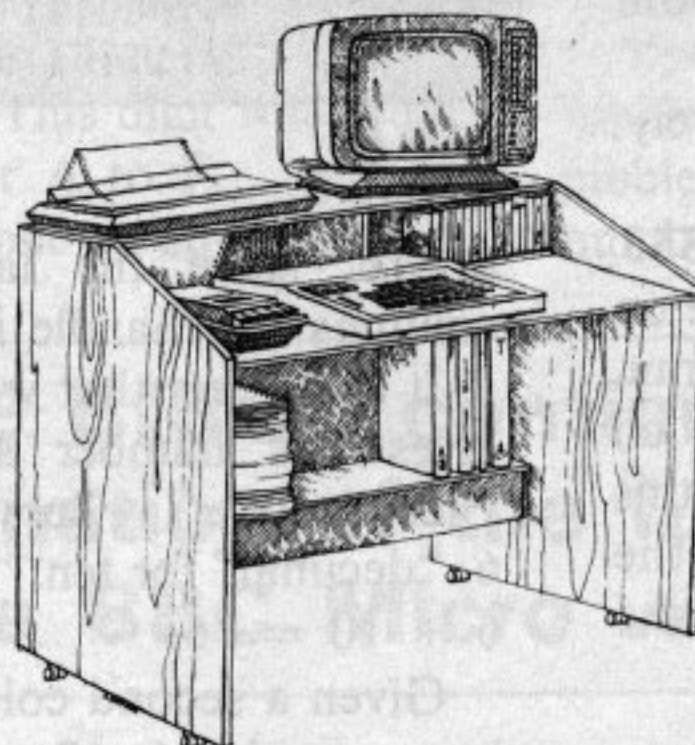
High Resolution **£299.00**

- Ideal for use with the BBC. ● Manufactured by the J.V.C.

STOP PRESS – STOP PRESS

As this is a brand new line please ring us for further details and specifications sheet.

THE "ORGANIZER" DESK



**ONLY
£49.50**

- Teak finish
- On castors
- Self assembly
- Full instructions provided
- Top shelf for monitor/printer
- Large desk top area
- Lower shelf for paper/book storage – ample room in front of the shelf for you to sit comfortably.

OPUS SOFTWARE "DOGFIGHT" FOR BBC 32K

A brand new and original game for 2 players using keyboard or joysticks.

8 levels of difficulty – levels 7 and 8 definitely for aces only. Fly your own World War I plane and try to shoot down your opponent before running out of bullets! Fly out of the sun, hide in the cloud cover but watch out for the lightning. Go off the screen to plan a surprise attack – but do not stray too far. In certain levels you may use variable speed – only suitable for experienced pilots.

Buy it now to practice before your friends do!! **ONLY £8.65**

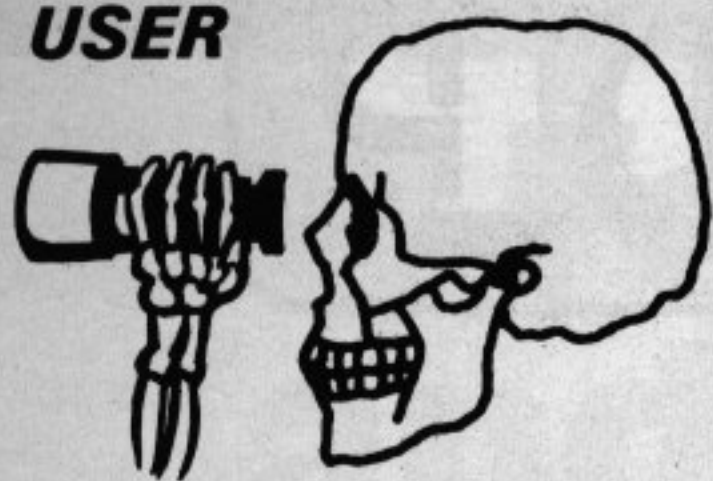
And send your order to:-

OPUS SUPPLIES

158 Camberwell Road, London SE5 0EE.
Tel: 01-701 8668. 01-703 6155/6/7



**BBC
MICRO
USER**



Deathwatch

and 24 other programs
listed in the pages of
BBC Micro User
Vol. 1, No. 1.

March Issue

DEATHWATCH, a superb arcade game that challenges you to use your skill to fight off enemy battleships, tanks and helicopters; **BINGO**, illustrating clever uses of the randomise function; **BUBBLESORT** routines; **TESTS** for function keys in machine code routines; a useful **CASSETTE BUGS FIX** for users with OS 0.1 ... and many **COLOUR** and **GRAPHICS ROUTINES** to help you create a kaleidoscope of screen designs which you can incorporate into your own programs.

*We've got
it all
taped!*

*Top-quality
cassettes of all the
programs listed
in BBC Micro User.*

*Save wear
on your fingers – and
ensure your programs
are error-free!*

£3.75 each

(incl. p&p)

**ORDER FORM
ON PAGE 73**

**BBC
MICRO
USER**

KING KONG



and 22 other programs
listed in the pages of
BBC Micro User
Vol. 1, No. 2.

April Issue

KING KONG, a fast moving game in which you pilot a helicopter to rescue girls perched on the Empire State Building before killing Kong; **GRAPHICS**, a suite of colourful demonstration programs; **NIM**, a structural game of strategy; **TOKENS**, first steps in unravelling the Basic ROM; **HOROSCOPES**, a fun program with useful error-trapping routines; **FORMATTER**, an essential disc utility; **DISASSEM**, a full machine code disassembler; **HEAT & LIGHT**, two measuring and plotting programs.

**BBC
MICRO
USER**

AIR STRIKE!



and 33 other
programs listed in the
pages of **BBC Micro User**
Vol. 1, No. 3

**THE
MICRO
USER**

SPACE PILOT

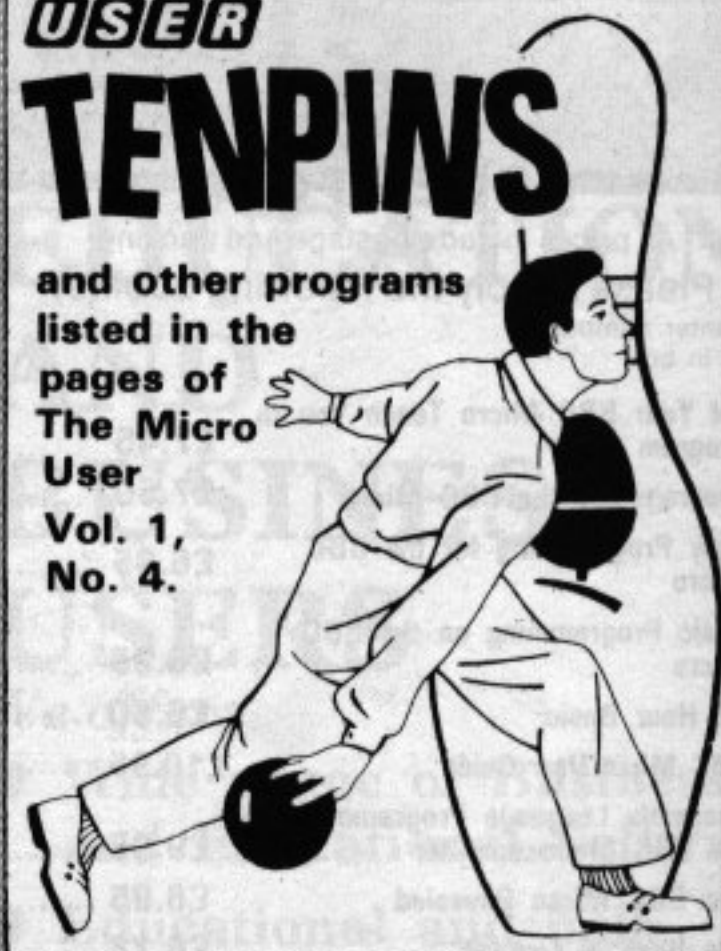
and other programs listed
in the pages of
BBC Micro User
Vol. 1, No. 4.



**THE
MICRO
USER**

TENPINS

and other programs
listed in the
pages of
**The Micro
User**
Vol. 1,
No. 4.



May Issue

AIR STRIKE, a fast and furious arcade game; Test your mental powers with **PELMANISM**; 25 **ANAGRAMS** for you to solve; **CHARACTER**, to generate vertical and inverted text; **TELETEXT**, animation in Mode 7 really brings the screen to life; **LAB**, a trio of programs to interface laboratory equipment; 10 programs to investigate the **OSBYTE** routine; **BEEB**, two joystick exercises; plus more **COLOUR** and **GRAPHICS** routines.

June Issue

SPACE PILOT, lost in space with dwindling fuel supplies, you must fight off repeated attacks from alien life forms. To replenish fuel, you have to perform a tricky docking manoeuvre, while to repair the inevitable damage you must land on a mountainous planet. **NOMISM**, you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. Can you survive drought, tsetse fly and other hazards? **PLUS** other listings from the June issue.

July Issue

TENPIN. A highly entertaining simulation of Tenpin Bowling. **SPACEPODS**. Try to beat alien hordes. **CUP**. Exciting techniques to bring 3D graphics to the BBC Micro. **SCRSAVE** and **CSRLOAD**. Two programs to allow you to save and load screens to tape or disc. **TEST** and **STEADY**. A pair of programs to accompany the Beeb Body Building Course. **BREAKFIX**. Don't let the Break key destroy all your precious variables! **FORMAT**. Creates neater listings.

BBC MICRO BOOKSHOP

Probably the best elementary BBC Basic text. An exceptionally readable book which more than lives up to its title.

£6.95

Easy Programming for the BBC Micro
Eric Deeson



An easy-to-follow, step-by-step guide to more advanced BBC Basic, following on from Easy Programming for the BBC Micro.

£6.95

Further Programming for the BBC Micro

Alan Thomas



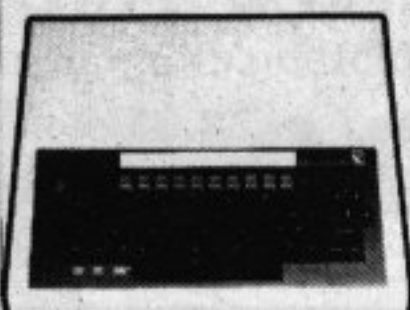
With 36 fun programs for the BBC Micro, this is exceptional value for money. It also gives many ideas for future projects.

£4.75

The Book of Listings

Fun Programs for the BBC Microcomputer
Tim Hartnell and Jeremy Ruston

ASSEMBLY LANGUAGE PROGRAMMING for the BBC MICROCOMPUTER



Ian Birnbaum

One of the best assembly language books ever written. Comprehensive, and specially compiled for the BBC Micro.

£9.95

The Computer Games Series

GAMES FOR YOUR BBC MICRO

SEVEN'S of entertaining games for only £2.95



Twenty good games listings plus hints on better programming and a comprehensive glossary. Excellent value.

£3.55

Structured Programming With BBC Basic

BOB ADHOLIC



A clearly written manual on good Basic programming and problem solving. This book could become the standard work.

£7.50

ORDER FORM

All prices include postage and packing

Please supply the following book(s)

Please enter number required in box

- | | | | |
|--------------------------|---|--------|-------|
| <input type="checkbox"/> | Let Your BBC Micro Teach You to Program | £7.45 | ..... |
| <input type="checkbox"/> | Programming the BBC Micro | £7.50 | ..... |
| <input type="checkbox"/> | Easy Programming for the BBC Micro | £6.95 | ..... |
| <input type="checkbox"/> | Basic Programming on the BBC Micro | £6.95 | ..... |
| <input type="checkbox"/> | 30 Hour Basic | £6.50 | ..... |
| <input type="checkbox"/> | BBC Micro User Guide | £10.95 | ..... |
| <input type="checkbox"/> | Assembly Language Programming for the BBC Microcomputer | £9.95 | ..... |
| <input type="checkbox"/> | The BBC Micro Revealed | £8.95 | ..... |
| <input type="checkbox"/> | The Book of Listings | £4.75 | ..... |
| <input type="checkbox"/> | 30+ Programs for the BBC Microcomputer | £5.95 | ..... |
| <input type="checkbox"/> | Further Programming for the BBC Micro | £6.95 | ..... |
| <input type="checkbox"/> | Games for your BBC Micro | £3.55 | ..... |
| <input type="checkbox"/> | Games BBC Computers Play | £7.95 | ..... |
| <input type="checkbox"/> | Structured Programming with BBC Basic | £7.50 | ..... |
| <input type="checkbox"/> | The BBC Micro: An expert guide | £7.95 | ..... |

I enclose my cheque/P.O. for

Cheques payable to Database Publications

Name

Address

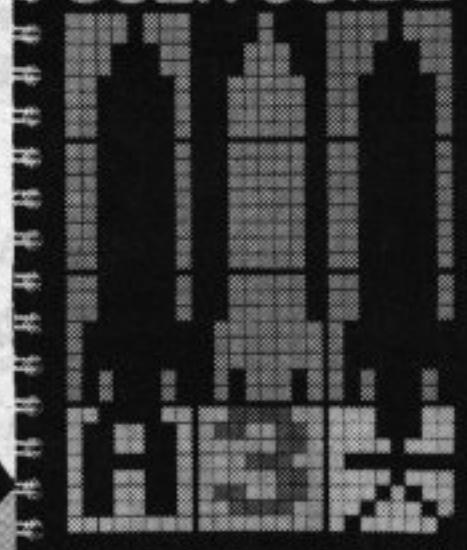
Post to: Database Publications,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

These special prices apply to UK readers only.
Prices to overseas readers are available on request.

The indispensable aid for anyone using the BBC Micro. Its 518 pages of solid facts include a vital 315-page reference section.

£10.95

USER GUIDE



Forty quality games. A varied selection ensures something for everyone.

£7.95

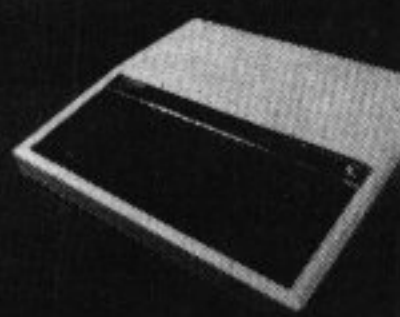
GAMES BBC COMPUTERS PLAY



TIM HARTNELL S.M. GEE MIKE JAMES

Programming the BBC Micro

Peter Williams Editor



Nowes Microcomputer Books

A thorough, thoughtful, though high-paced review of elementary BBC lore. Includes topics such as the disc system and interfacing.

£7.50

THE BBC MICRO
an expert guide



MIKE JAMES

An intelligent, information manual on the workings of the BBC Micro. Recommended reading for anyone beyond the beginner's stage.

£7.95

WALTERS COMPUTER SYSTEMS LTD.

THE OFFICIAL WEST MIDLANDS **BBC** SALES & ENGINEERING CENTRE

Fast, Efficient and Competitive - Why go elsewhere?

12 HAGLEY ROAD, STOURBRIDGE, WEST MIDLANDS DY8 1PS · TELEPHONE: STOURBRIDGE 70811 (9 LINES)

THIS MONTH'S
SPECIAL
REDIFFUSION
14" RGB/COMPOSITE VIDEO
COLOUR MONITOR
£190
PLUS VAT & CARRIAGE

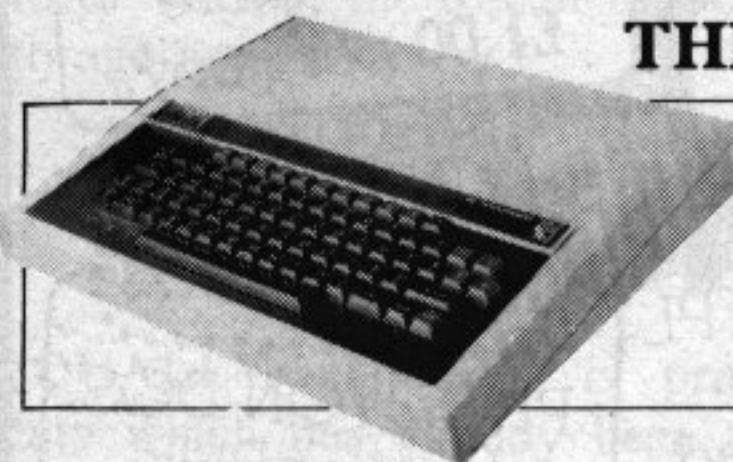


OPEN
SATURDAYS TOO!
SALES & SERVICE
CENTRES AT BIRMINGHAM
WOLVERHAMPTON,
AND SHREWSBURY
PHONE (03843) 70811
FOR DETAILS

Approved Dealer for the IBM PC, CBM, SINCLAIR, DRAGON, EPSON, MICROVITECH, CUMANA ETC.

Home & Business Computers

THE NORTH'S LEADING COMPUTER SUPPLIERS



HARDWARE

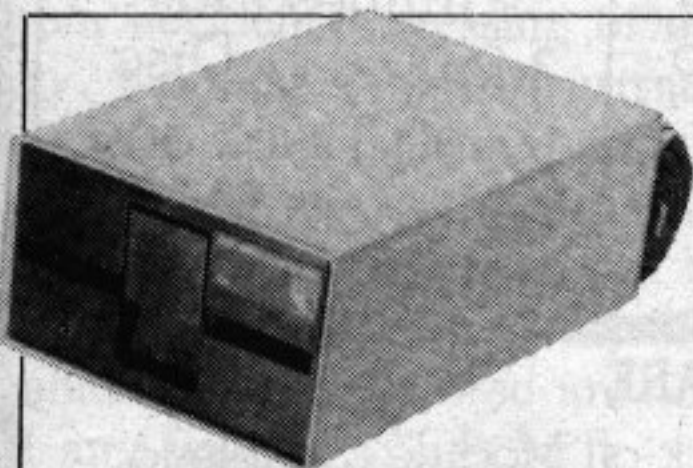
BBC MODEL B

£399

DISC I/F KIT

£95 (Fitted)

Wide range of add-ons



DISC DRIVES

(inc. Utilities Disc and Manual)

TEAC 100K singled sided

£230

TEAC 200K single sided

£305

TEAC 400K double sided 80 track

£397

New Slimline 100K Disc Drives

£205

Plus LVL/Acorn Disc Drives



SOFTWARE - from
£4.50

Micropower, Salamander, Digital
Fantasia, Acornsoft, IJK, BBC
Soft, Bug Byte, etc.

**ALL PRICES
INCLUDE
VAT AT
15%**

PRINTERS AP 100A £229 SPARKJET £420
RX 80 £329 FX 80 £499

SEND FOR PRICE LIST

SERVICE AND SUPPORT BY FERRANTI

OLDHAM

54 Yorkshire St., Oldham, Lancs.

Tel: 061-633 1608

ECCLES

4 Northway, Eccles Precinct

Tel: 061-707 2004

ROCHDALE

73 Yorkshire St.,

Rochdale **OPENING MAY**

EDUCATION AND BUSINESS USERS

We offer:

- Wide range of Business and Educational Software.
- Educational and bulk order discounts.
- Warranty and post warranty maintenance.
- On site maintenance if required.
- Collection and delivery of repairs if required.

UK MAINLAND MACHINE
DELIVERY £5.00



Eltec computers

HOME & BUSINESS TECHNOLOGY

Probably the widest selection of software available by mail order.

All the top manufacturers including Acorn Soft, IJK (Sinclair), Superior Software, Bug Byte, Program Power, Hessel, Procyon.

All NEW
All in Stock
(as long as you're quick)

BBC MICRO COMPUTERS

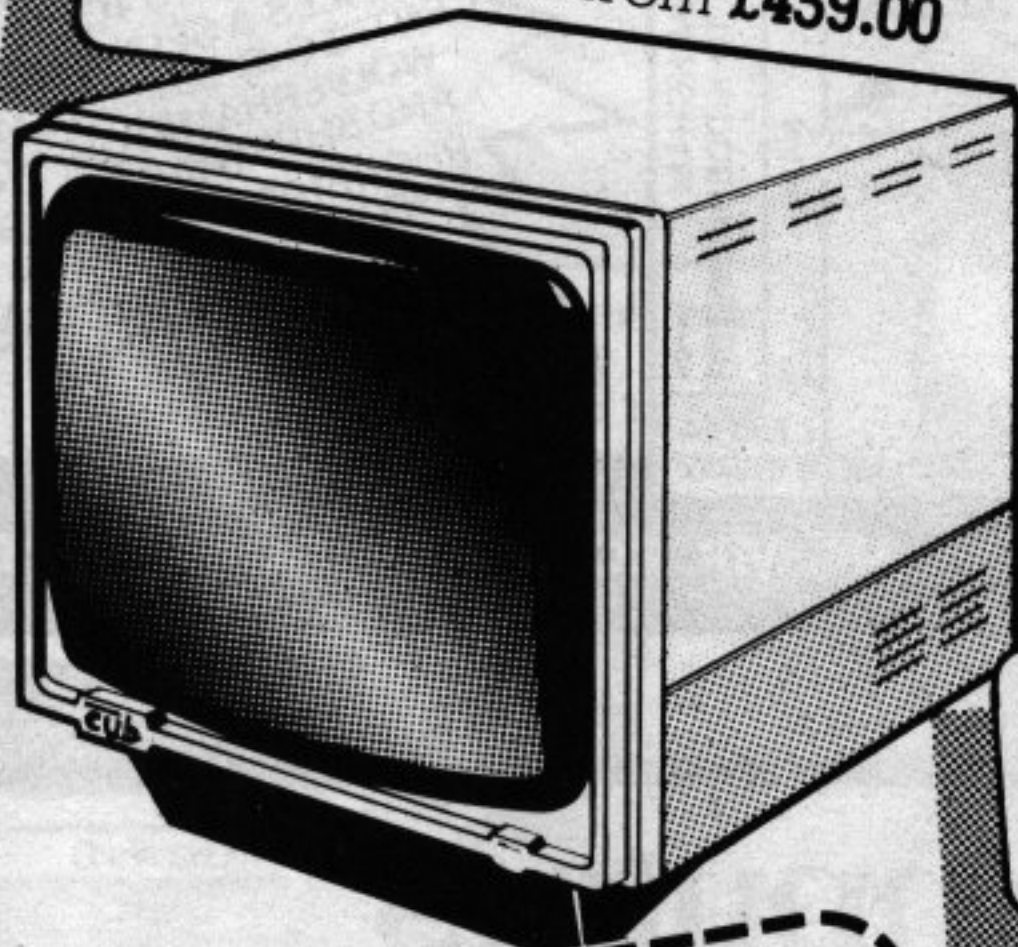
BBC MICROCOMPUTERS, with the latest 1.2 operating system Model B **£399**

FREE Acornsoft game with every computer



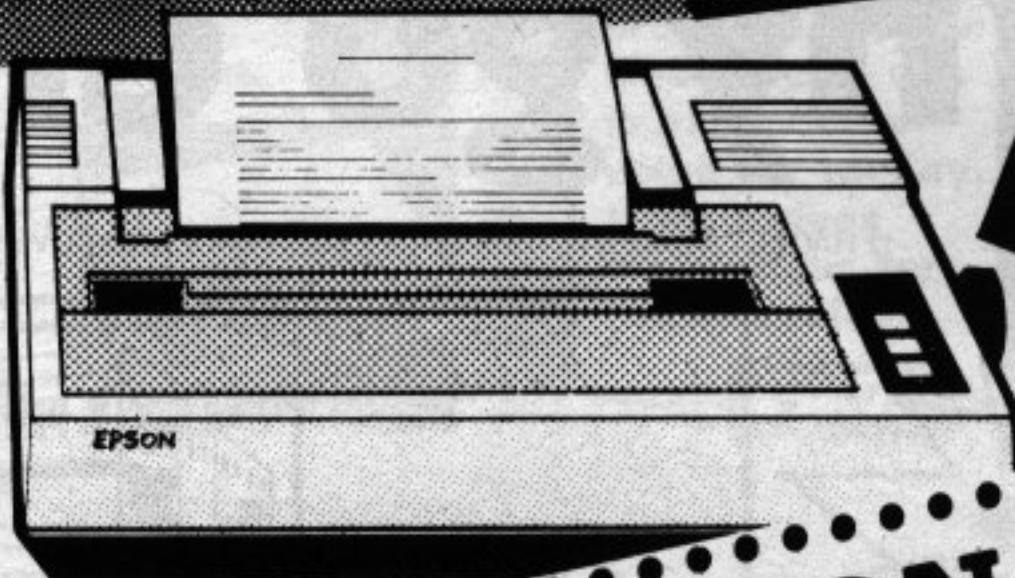
Microvitec

Microvitec "Cub" Monitor. True 80 Column Definition at a new low cost from **£459.00**



PRESTEL

PRESTEL Available now on the BBC Micro OEL Acoustic Modem & Software & Lead. Converts the BBC Micro into a Prestel/private viewdata receiver. **£175.00** all inclusive.



EPSON

New Epson FX80 F/T III Printer 160 c.p.s. Parallel **£450.00**

TEAC

TEAC 40T/80T Switchable Twin Disc Drive 200K/400K **£644.00**

ATPL EPROM PROGRAMMER

Make your favourite programs full time residents with an ATPL EPROM PROGRAMMER **£138.00**. Program, verify, read and check for blank, 2516, 2716, 2532, 2732, 2564, 27128, 27256. Single Rail Eproms. Also Eprom Eraser **£55.20** incl.

Acorn user & BEEB user

Acorn user & BEEB user, back issues **£1.25** each, orders for 2 or more **£1.00** per copy.

PROCYON DOS

PROCYON DOS Utilities Plus Manual (1 Disc for 40 Track and 80 Track) **£17.25**

PROTECTIVE COVERS AND CARRYING CASES

Polyester Cotton Cover. 3.97
Soft PVC Cover. 4.45
Hard Carrying Case. 55.20
Soft Carrying Case. 23.00
Cassette leads. 4.00

SOFTWARE

Killer Gorilla, Program Power. 6.95
Road Runner, Superior Software. 7.50
Centipede, Superior Software. 7.50

JOYSTICKS AND SOFTWARE

BBC Joysticks - pair. 13.00
BEEBSTICK - Fully proportional for Computer Aided Design. . . 29.75
JOYSTICKS GRAPHICS - Draw and Save your own Line Diagrams. 5.75
JOYSTICK PACK 1 - Contains "ZAP" and "ETCH A SKETCH". 5.75
GRAPHSTICK - Computer Aided Design for any joystick. . . . 7.95

HARDWARE

Sound Pick-off Module (Simple to fit). 6.95
Loudspeaker in cabinet plus cable for above pick-off. 27.00
Loudspeaker plus Amplifier for above pick-off (Blaster). . . . 37.50
BIG EARS Speech input for BBC Computer. 56.00
CHATTERBOX Gives your BBC Computer unlimited vocabulary. 56.00

All above prices include VAT

For full price lists or further details of any products send s.a.e.

ELTEC COMPUTERS
217 Manningham Lane, Bradford, BD8 7HH.
MU Tel (0274) 722512.



A handy back door for the editor

WHEN debugging or editing programs it is useful to be able to escape from the program to make adjustments and then to jump back in without entering all the data again.

When you alter the basic program you may overwrite the variable storage locations. To prevent this happening make the first line of your program:

```
0 LOMEM=TOP + &400
```

This line creates a gap of about 1000 bytes between the end of the basic program TOP and the start of the variable storage area LOMEM.

Then program key 8 with:

```
*KEY8 ?&480=?&2: ?&481=?&3:
?&4FF=?&D: M=?&480: £$=?M
$M: M=?&D00: $M=£$!M
```

Looking at it line by line:

```
?&480=?&2: ?&481=?&3
```

stores Vartop, the top of the variable storage area.

By JOHN LORD

```
?&4FF=?&D: M=?&480: £$=?M
```

positions &D so that the string indirection operator can be used to move the variables map.

```
M=?&D00: $M=£$!M
```

moves the variable map to a safe place &D00.

Pressing ESCAPE followed by f8 enables editing to be carried out.

Key 9 is programmed to return the variable map and Vartop.

```
*KEY9 M=?&D00: £$=?M: M=?&480: $M=
£$: ?2=?&480: ?3=?&481!M
```

Typing RUN (Return) will restart the program, but you will have to work through the program to the point at which you escaped because RUN

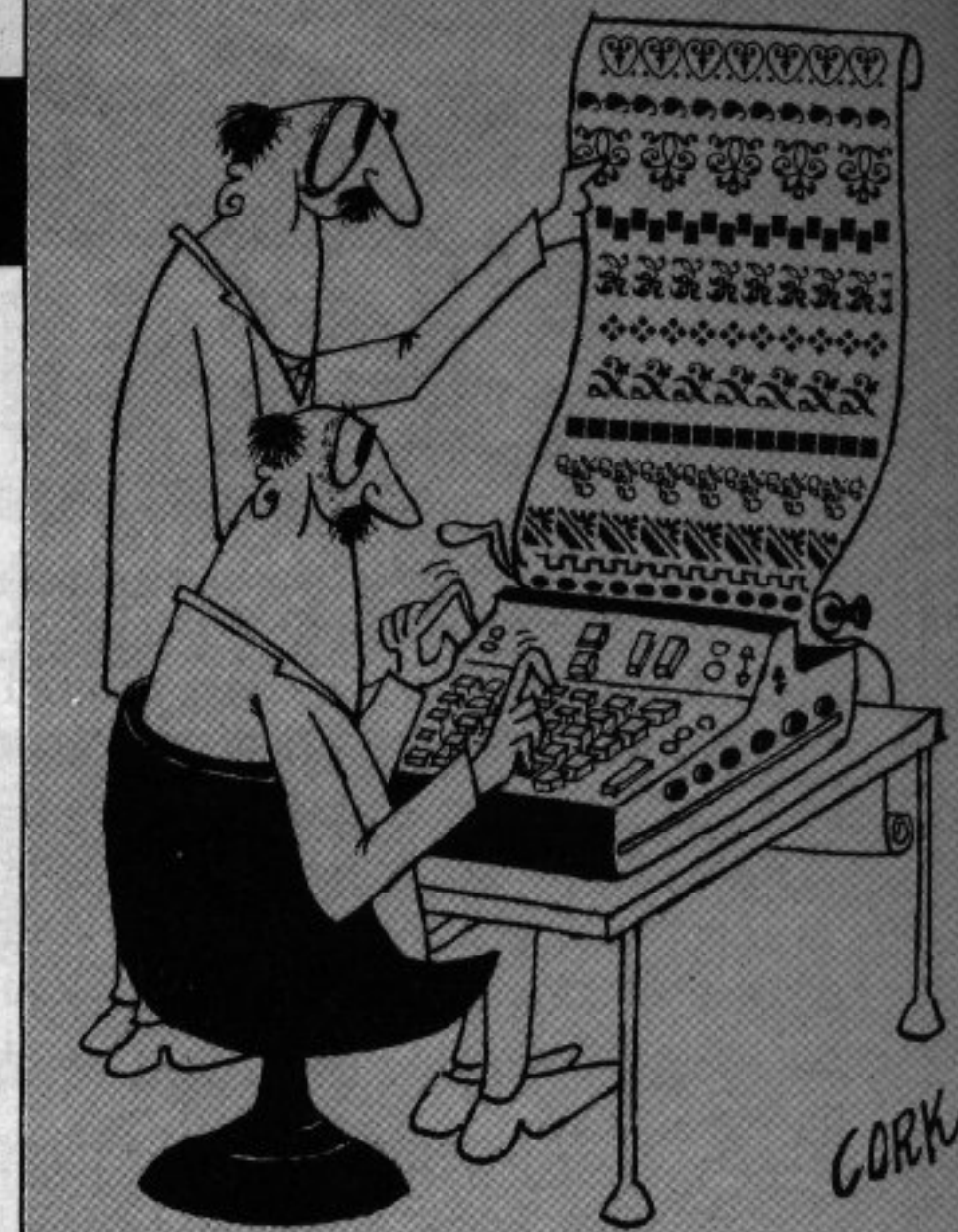
clears the variable map.

A better way when you have completed the alterations is to press f9 and type GOTO ERL then Return. Escape is classed as an error and has the code 17.

This technique enables you to rejoin your program at the error line. Unfortunately if you left the program in the middle of a procedure or a loop, joining the program in this way leads to a no PROC error message when the ENDPROC is encountered.

The only way which always works is to GOTO some suitable line before the start of the loop.

The only other requirement is to dimension your arrays early in the program so that you do not try to dimension the array twice.



FIXING THE BREAK KEY

EQUALLY important is protecting data which has already been entered from accidental pressing of the Break key. Nothing is more frustrating than to have spent a long time entering information and to lose that data.

When Break is pressed all reference to the variable storage is deleted but the values which are stored are not altered in any way.

If the position in the program, the variables map and Vartop are stored then all is not lost. With the routines in Program I, each time data is entered, the variable map, Vartop and the next line number are stored where they will not be changed if Break is pressed.

The time taken to perform each update is negligible compared to the time spent in inputting data.

If Break is pressed the operation OLD is performed, the variable map and Vartop are renewed and the program continues at the line following

```
10 REM BREAK FIX AND REPEAT..LOOP
20 REM (C) J.F.LORD APRIL 1983
30 REM RETAINS DATA AND POSITION
40 REM WHEN THE BREAK KEY IS PRESSED
100 LOMEM=TOP+&100
110 ?&70=?&0B: ?&71=?&0C:
PROCstorenextline
120 REPEAT
130 A$=GET$
140 PRINTA$:
150 line$=line$+A$
160 PROCmapoff
170 UNTIL A$=CHR$(13)
180 PRINT CHR$(&0A)
190 PRINTline$
200 END
210 DEF PROCstorenextline
220 *KEY10 OLD M PROCnextline M
230 LOCAL op,LL%
240 op=(256*?&71+?&70)
250 LL%=?op: ?&70=?op+LL%-21:
?&71=?op+LL%-1)
260 ENDPROC
270 DEF PROCnextline
280 M=?&D00: £$=?M: M=?&480: $M=£$:
?2=?&480: ?3=?&481
290 PRINTline$:
300 Nextline%=(256*?&70+?&71)
310 GOTO Nextline%
320 ENDPROC
330 DEF PROCmapoff
340 M=?&480: ?&480=?&2: ?&481=?&3:
?&4FF=?&D: M=?&480: £$=?M:
M=?&D00: $M=£$
350 ENDPROC
```

the last data input.

Program I is a simplified version of the input stage of a text handling

program. The only effect of pressing Break is to clear the screen, print the

From Page 67

usual messages plus PROCnextline.

This procedure prints line\$, the text which had been entered prior to the Break key being pressed.

Input of text is terminated when the Return key is pressed. The data entered is then printed out so that you can easily compare the two.

One of the programmable keys could call the procedure PROCnextline and be used as an excellent way to rejoin your program when you have finished editing.

The essential parts of the program are:

```
100 LOMEM=TOP+&100
```

```
110 ?&70=?&0B: ?&71=?&0C
```

```
:PROCstorenextline
```

Line 110 stores the current position in the basic text in locations &70 and &71.

PROCstorenextline calculates and then stores the next line number in the program.

op is the position in memory of the beginning of the current line.

PROCmapoff has the same effect as key 8 in the program editing routine in

that it moves the memory map to &D00 and also saves Vartop.

It is important that this procedure is called after each data entry. If not, then all the variables may not have been declared when the break key is pressed.

Then data could be lost and need to be re-entered.

PROCnextline put the variables map back in position, restores the pointer to the top of the variables and then goes to the next line.

Saving works of art

IF you have created stunning artwork on the BBC Micro and want a permanent record, then the simple routines below will load and save a screen onto tape.

```
10 REM LOAD SCREEN
```

```
20 VDU 21
```

```
30 *LOAD SCREEN
```

```
40 VDU 6
```

```
960 REM SAVE SCREEN
```

```
970 VDU 21
```

```
980 *SAVE SCREEN SSSS VVVV
```

```
990 VDU 6
```

Where SSSS, the start address, is the value of HIMEM in hex (given by PRINT HIMEM).

For the different modes, the value of SSSS is given by:

MODE	MODEL B	MODEL A
0, 1, 2	3000	—
3	4000	—
4, 5	5800	1800
6	6000	2000
7	7C00	3C00

3C00 For a Model A replace VVVV by 4000, and on a Model B by 8000.

The screen saving routine should be placed in the basic program to run once the screen has been completed.

The program will pause at line 980 until the return key is pressed, so allowing the tape to be positioned before recording starts.

VDU 21 and VDU 6 disable then enable the VDU drivers so that the message "RECORD THEN RETURN" and the file name are not printed on the screen, and subsequently dumped to tape. **Anthony Robinson**

BBC OWNERS

Why not consider the HOBBIT FLOPPY TAPE SYSTEM for your computer?

The HOBBIT gives you all the facilities you would expect from a floppy disc at a fraction of the price.

Brief Specifications

- ☆ Read/Write speed of 750 BYTES per second
- ☆ Capacity: 101K BYTES per CASSETTE
- ☆ Average access time 22 seconds
- ☆ Up to 138 FILES per CASSETTE
- ☆ Completely automatic – no buttons to press
- ☆ Fully built, boxed and tested. Just plug in and go
- ☆ System can support TWO DRIVES

Available from stock **PRICE £135.00 plus VAT**

Also available for NASCOM computers **PRICE £120.00 plus VAT**

Access and Barclaycard accepted

For more details contact:

Ikon Computer Products

KILN LAKE, LAUGHARNE, CARMARTHEN, DYFED, SA33 4QE. Tel: Laugharne (099 421) 515

See us
at the

**BBC
MICRO
USER
SHOW**

June 24 - 26
Renold Building,
UMIST,
Manchester

Stand No.
59

MOONRAIDER

**A GREAT NEW BBC MODEL B PROGRAM
FROM BRITAIN'S LEADING SOFTWARE HOUSE!**

You're flying a highly manoeuvrable 32K Space Fighter armed to the teeth with a rapid-fire laser cannon and the latest Tryex bombs. Your mission is to penetrate the alien moon defences. Against you are self-firing rockets, nuclear Ack-Ack guns, spacemines, 'fizzers', and meteors, not to mention the network of narrow passageways which must be negotiated. You have only limited fuel which needs to be replenished by either bombing

the enemy fuel dumps or docking with the refuelling station. There are 6 phases to get through and 4 levels of

difficulty. The game can be started at any phase and on any level. The controls are either from joysticks or from standard or user-defined keys.

This exciting program only £6.95!



Other B.B.C. programs available: Swoop (B) £6.95/Croaker (B) £6.95/Chess (B) £6.95/Laser Command (B) £6.95/Galactic Commander (B) £6.95/Alien Destroyers (B) £6.95/Adventure £6.95/Cowboy Shoot-Out (B) £5.95/Filer £8.95/Micro Budget £6.95/World Geography (B) £5.95 Timetrek (B) £6.95/Spacemaze (B) £5.95/Martians (B) £5.95/Astro Navigator (B) £4.95/Star Trek £4.95/Munchyman £5.95/Seek £5.95/Eldorado Gold (B) £5.95/Cat and Mouse £4.95/Mastermind £3.95/Reversi 1 £4.95/Reversi 2 (B) £4.95/Roulette (B) £4.95/Gomoku £3.95/Zombies £3.95/Dissassembler £5.95/Constellation (B) £5.95/Junior Maths Pack (B) £5.95/Where? (B) £5.95.

Written any Programs? We pay 20% Royalties for DRAGON, SPECTRUM, B.B.C. PROGRAMS

WE Guarantee
THAT ALL OUR ADVERTISED PROGRAMS HAVE BEEN COMPLETED AND ARE READILY AVAILABLE

**WE ARE AUTHORISED DEALERS
FOR ACORN ATOM, BBC MICRO
& DRAGON 32**

SPECIAL OFFER

Deduct £1 per cassette when ordering two or more.

MICRO POWER LTD.
Dept. BMU 7
8/8a REGENT STREET,
CHAPEL ALLERTON,
LEEDS LS7 4PE
Tel: (0532) 683186 or 696343

Please add 55p order P & P + VAT at 15%

Please Note:

All programs are now available at all good dealers or direct from MICRO POWER LTD.



Two of the all-time Arcade greats

BOMBER SCRAMBLE

For over two years our best selling TRS-80 Arcade game was Mike Chalk's acclaimed Bomber Scramble. Now there's a new generation Scramble, in the colours, sound and high resolution graphics of the BBC Micro.

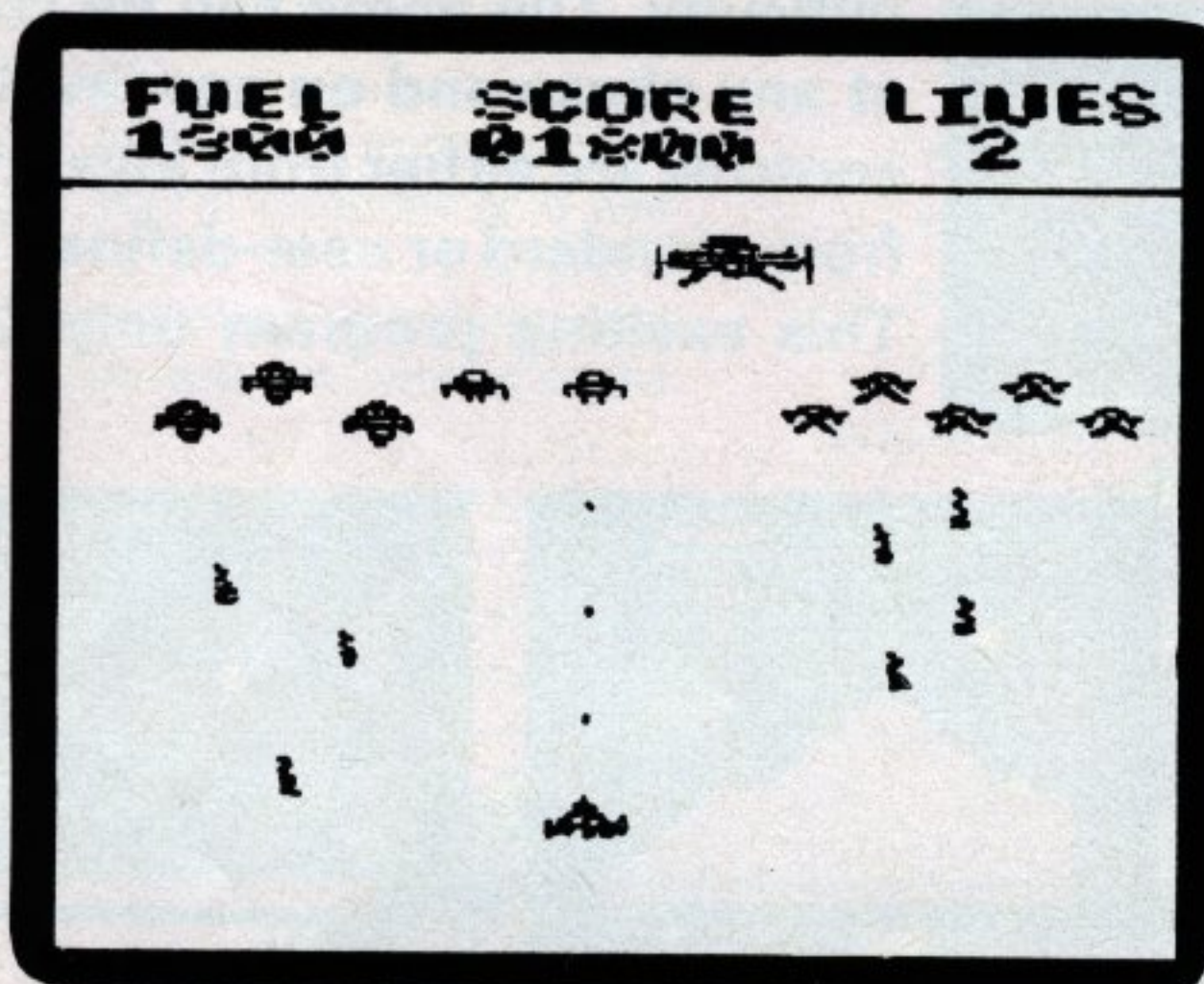
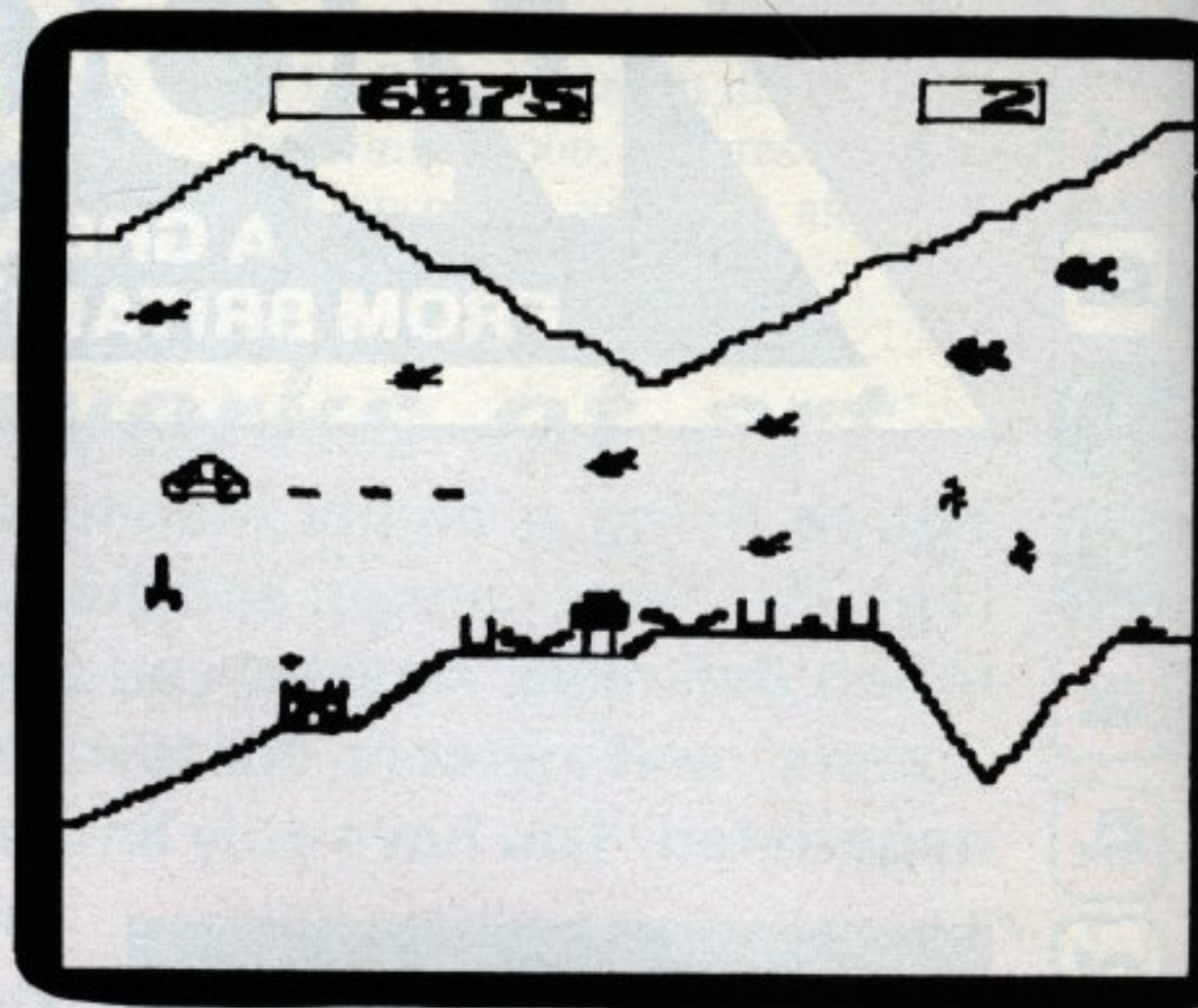
This new one has so much it's unbelievable! Two types of fighters—with their own unpredictable movements. Ack-ack—which no other BBC game, Acorn's included, can offer—with random detonations. Intelligent rockets—which are released as you come on target. Blimps—another Kansas 'original' to make the game harder.

The game starts fairly easy, then gets harder and harder, with of course the ground and 'top' moving all the time—and completely random, with no two games ever the same. As the game progresses so more and more is 'thrown' at you.

Keyboard or joystick operation giving infinite control of the bomber, the bombs and firing. Top score table and extra 'lives'.

There is no other Arcade game to touch it!

£9.50 Vat and post paid



COSMIC FIGHTER

As Kansas reigned supreme with its TRS-80 Arcade games in Britain, Big Five Software were our counterpart in the States, with their 'flagship' being the famous Cosmic Fighter.

This fast-action multi-screen game has been brought to the BBC Micro by Kansas programmer Wal Mansell.

Four entirely different 'screens' with four different types of Alien, each with its own brand of attack, and all of them relentlessly homing down on your base. Four games in one in fact!

Move your base to fire whilst dodging their bombs, but as soon as you wipe out one lot, another type appears—and all of them hell-bent on your destruction!

Then comes your Mother Ship, so home onto her to re-fuel, but get it exactly right... Then it all starts again—with a difference—you have to hit each Alien twice to destruct!

Colour, sound, keyboard or joystick control, with of course the usual Kansas top score table. An all-time great.

£9.50 Vat and post paid

SNAKE

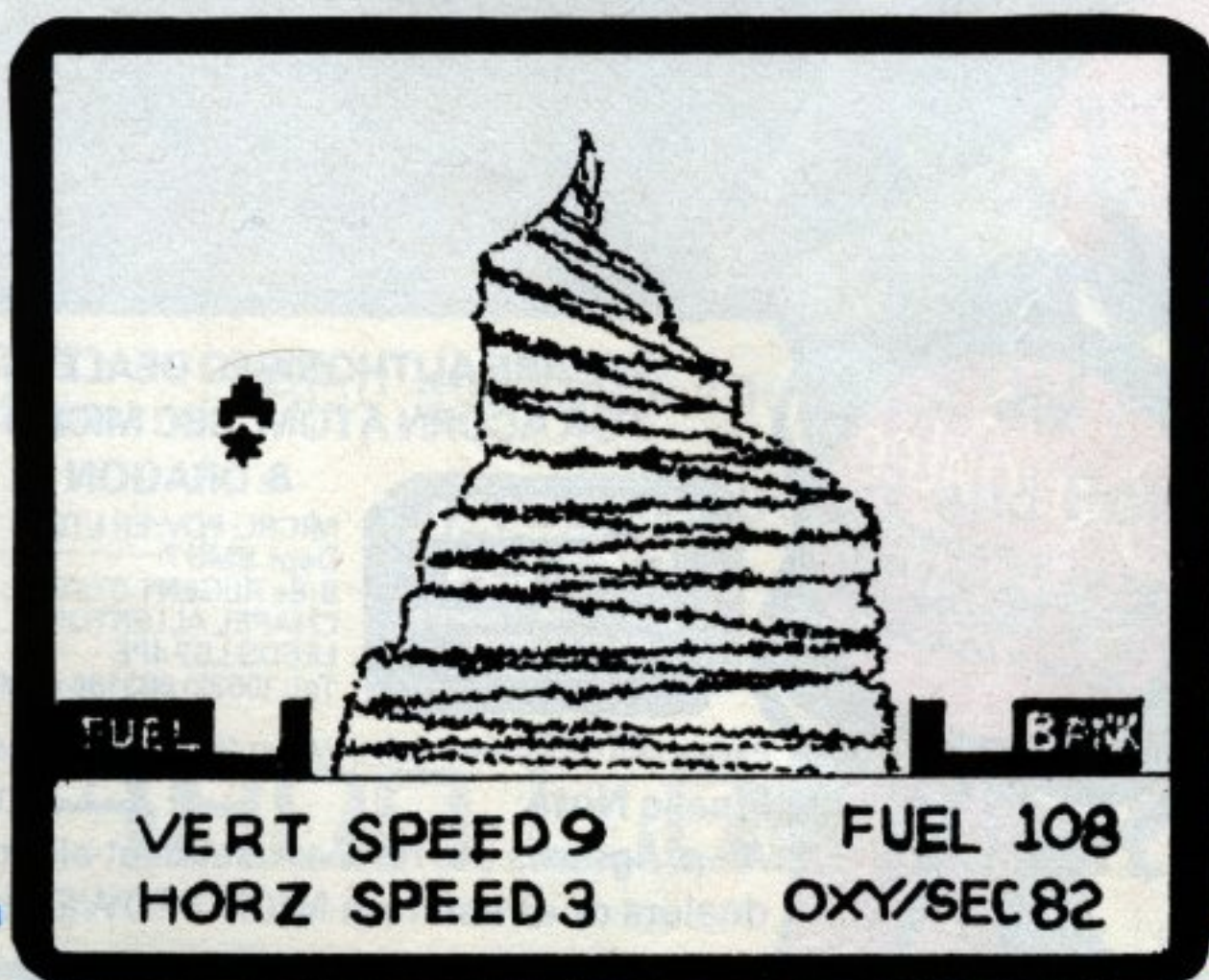
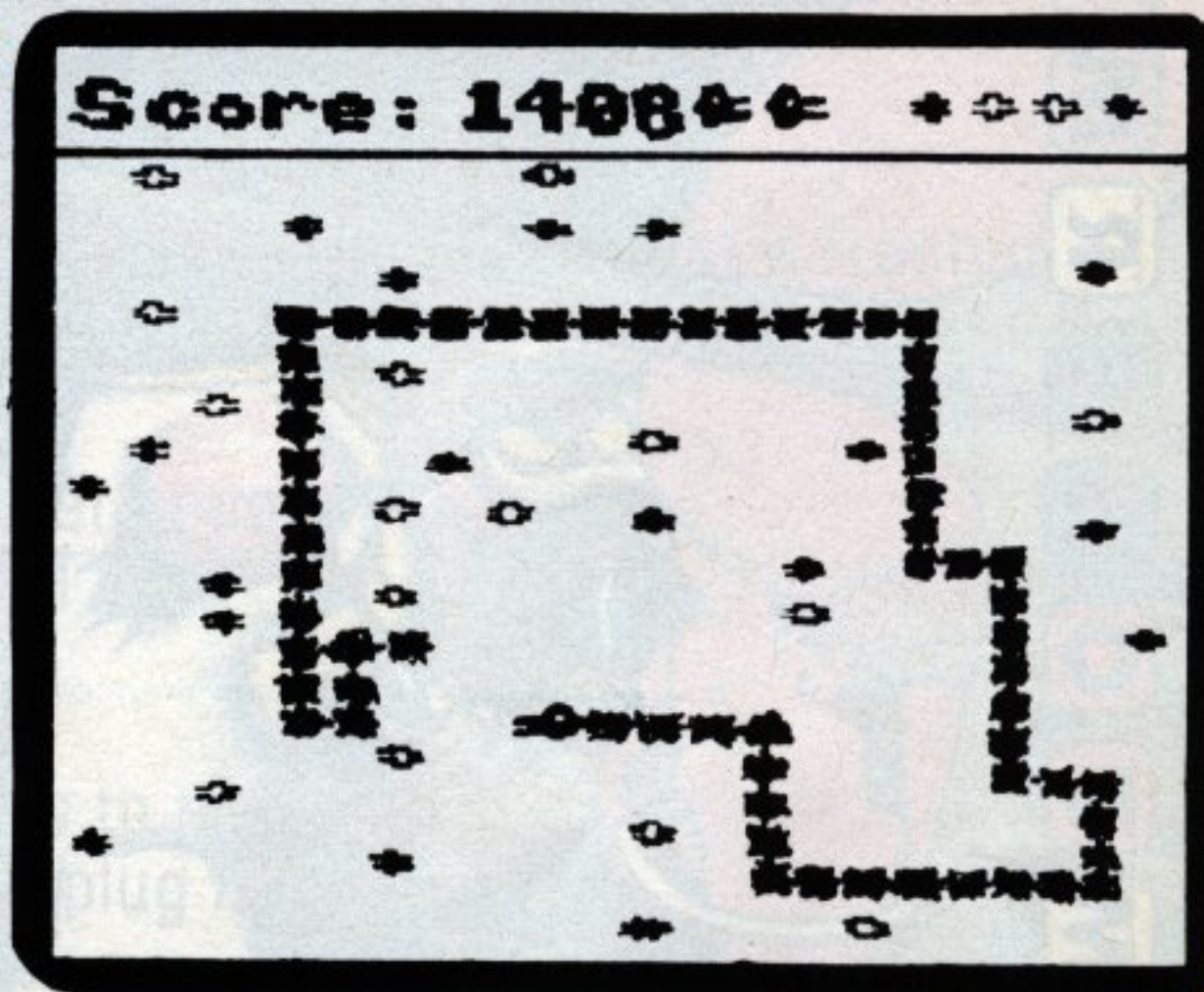
You have control in all directions of the Snake to devour the mushrooms. It's a real snake, not just a line, pulsating along and growing longer and longer as each mushroom is devoured.

Just like the arcade game, you can actually increase speed to try and clear a screen in less than a minute to earn yourself a bonus. But don't devour the toadstools!

Then it gets harder. And harder. And harder. For as each screen is cleared the next one becomes more difficult. Not only does the speed automatically increase but you get a split screen. And if you manage that, a totally unheard of, double split screen!

Colour, sound, keyboard or joystick operation and of course the Kansas top score table.

£8.50 Vat and post paid



SPACE CAB

Slow the pace right down now, to a thinking mans' game. Ferry passengers over the random mountain, choosing the number, the amount of fuel and liquid oxygen to get you there and back. It's totally logical—the more passengers you carry the more fuel and oxygen you'll need. There's a purpose too, for you have to earn enough to pay off the mortgage on the craft or it's re-possessed!

Not too easy to play as control must be spot-on or you can run out of fuel, starve the passengers of oxygen or crash!

Infinite control of thrust and braking in all directions allowing you to ascertain the best velocity both in ascent and deceleration. Very realistic sound effects. Colour and totals.

£7.25 Vat and post paid

PROGRAMS ARE CASSETTE BASED AND RUN ON ALL 32K SYSTEMS

Make the most of your micro DATA FILE

The all-singing, all-dancing Data File, built on five years experience yet purposely created specifically for the BBC Micro.

Experience has taught us that not only do any two people never need the same in a data file, but even one person wants it to be capable of many things. We think that the Kansas Data File fulfills this need, and will be recognised as the standard.

It's main appeal must be its sheer versatility. You can define not only the length of any field, but the actual number of fields—up to 20! So you can make it an ordinary name and address file, or anything extraordinary that you might wish. And all permanently saved to tape...

The number of files available depends entirely on the length of the file. Up to 1947 with a single field.

Here are the facilities of Data File:

Create File Define any number of fields up to 20. Define length of each field up to 255 characters. Name each field as required. Computer automatically uses maximum memory.

Insert Simply type in pressing Return for next field.

Search Data File has a most unique Search facility, for it will search any defined field throughout the whole file, but not only this, it can be asked to search for the item at the start of the field or in fact anywhere in that field, making it a very powerful facility indeed.

Edit Couldn't be simpler—just use the cursor keys.

Jump A very handy feature, allowing you to jump to any particular file you require.

Sort Not just the normal first field sort, but one which allows you to define the sort field.

Status Not found in normal data files, this is useful for it tells you the file name, when updated, files used, and most important how many files free.

Print A most important facility, allows the printing of the files, as required.

Delete Deletes unwanted files, and at the same time the remaining records will be closed up.

Save Allows you to save the entire file to cassette. This can be loaded at the start when Data File is run.

To facilitate the ease of operation, all the above functions are on the red function keys, so needing just a single key stroke to bring into operation.

£12.50 Vat and post paid

Five years in
knowing the needs
of micro users has
resulted in these two
programs for the
BBC...

PERSONAL ACCOUNTS

Another exclusive Kansas program, designed for the micro user to keep an accurate check on all accounts.

This program is not limited to personal cash accounts, but can also be used in conjunction with a cheque account or even to keeping a credit card account in order. In fact there is little limit to its use, where the transaction of money is concerned.

As it creates its own files to tape, it can be used for a multitude of purposes, each having its own file and thus being loaded to handle transactions.

It can hold 500 transaction entries!

A great asset of the program is that it can be customised by altering any of the 32 items, with in fact 10 already set aside for this purpose, with the others too being simple to change.

Each entry has its own number, together with amount, date and item, with all details and current balance shown after each entry. This makes it very straightforward to add, either payments or deposits to the file.

There is also a list facility, even allowing the scrolling through the entire file.

Facility is also provided for alteration of any entry, with automatic update of the current balance. The balance itself can be altered, which is useful when using as a credit card account, as a monthly payment is made.

There is a clever little routine which allows you to estimate the effect any particular payment may have on your account, so you can see if you can really afford it or not!

A status section lets you see the current balance, file name, when updated, transactions on file and spare entries.

Personal Accounts is very friendly in use, with messages should you do something wrong, such as using the same transaction number twice.

Files can be saved to cassette, and you have the choice of either loading in a saved file or creating a new one, when the program is run.

Use is made of colour, with the obvious showing of deposits or payments.

£12.50 Vat and post paid

**When you buy from Kansas you are buying from the
longest established software publishers in the country**

**The only company that can give a lifetime guarantee
and assured same-day first class post service**

APPROACHABLE—We attend all the major computer exhibitions

Recognised Brand Leader in microcomputer software

Kansas

Kansas City Systems, Unit 3, Sutton Springs Wood, Chesterfield, S44 5XF. Tel. 0246 850357



THE MICRO USER

A subscription
will ensure you
get your own
personal copy
**HOT OFF THE
PRESSES** month
after month for
the next year.

Be one of the first to get each issue!

Every owner of a BBC Micro – and everyone thinking of buying one – needs to get Micro User every month. It's the biggest, brightest, most authoritative yet completely independent guide to a machine that has so much potential you will never tire of reading about its remarkable capabilities.

You can buy Micro User from your local newsagent or station bookstall. Or you can take out a 12 months subscription and have it delivered by post.



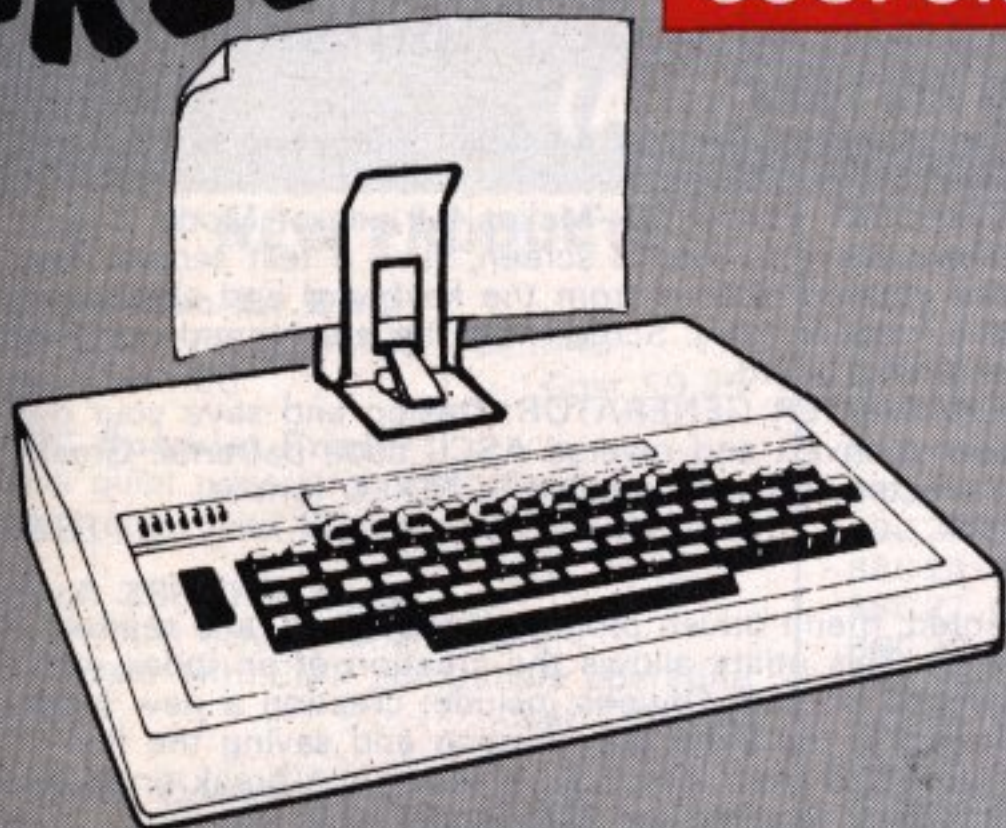
Copies of these back issues are still available at £1.25



Cassette tapes of Micro User programs – £3.75

Or take out a year's subscription and have your cassette posted to you each month. You can start your subscription from any issue to take advantage of this offer.

FREE



COMPLETE THIS COUPON TODAY

If you take out a subscription to *Micro User* you will receive completely free the sturdy copy-holder illustrated above, together with a large crib card containing essential information and charts that will save you continually referring to the User Guide. This free gift is for a limited period, so subscribe now!



Sweat Shirts

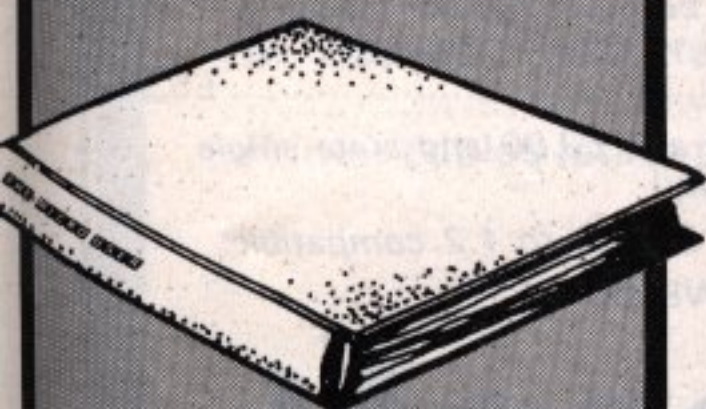
£6.29

T Shirts

£3.29

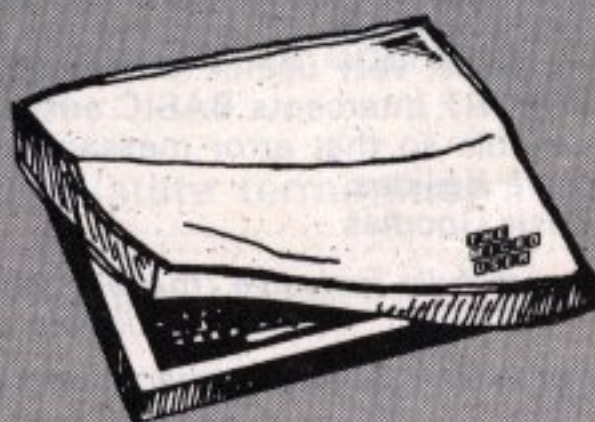
Blue printing on either light blue or white backgrounds

Keep your collection of *Micro User* complete with these handsome binders



£3.95
(UK)

Your BBC Micro needs protecting!



£3.25

Top quality pale blue P.V.C. dust covers

ORDER FORM

All prices include postage, packing and VAT, and are valid to 31 August 1983.

Please enter number required in box

£ p

Micro User annual subscription

UK £12 ☐
EIRE £13 ☐
EUROPE £18 ☐
Surface mail - USA £15 ☐
Air mail - USA £25 ☐
Surface mail - Rest of world £15 ☐
Air mail - Rest of world £30 ☐

Commence with issue TOTAL

Micro User back issues

March 1983 ☐
April 1983 ☐
May 1983 ☐
June 1983 ☐
TOTAL

☐ £1.25 UK
☐ Rest of world:
☐ £1.50 - Surface
☐ £2.50 - Air mail

Cassette tape annual subscription

£40 (UK & Overseas) ☐
Commence with tape (state month) TOTAL

Cassette tape single copies

£3.75
(UK & Overseas)
March 1983 ☐
April 1983 ☐
May 1983 ☐
June 1983 ☐
July 1983 ☐
TOTAL

Dust Covers

£3.25 ☐
(UK & Overseas) TOTAL

Binders

£3.95 - UK ☐
£5.00 - Overseas ☐
TOTAL

T-Shirts £3.29 (UK & Overseas)

Sweat Shirts £6.29 (UK & Overseas)

		T-Shirt		Sweat Shirt	
		Blue	White	Blue	White
Age 6-8	28"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Age 10-12	30"-32"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Small	34"-36"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medium	36"-38"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large	38"-40"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extra Large	40"-42"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		TOTAL			

Payment: please indicate method (✓) TOTAL

☐ Access/Mastercharge/Eurocard
☐ Barclaycard/Visa
☐ American Express

Card No. _____
Expiry Date _____

☐ Cheque/PO made payable to Database Publications Ltd.

Name _____

Address _____

Signed _____

Send to: Micro User, FREEPOST, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.
(No stamp needed if posted in UK)

Or you can order by phone quoting credit card number and expiry date.

061-456 8383 9am - 5pm

061-456 4157 (subscriptions/back numbers)

PRINTER BONANZA!

EPSON

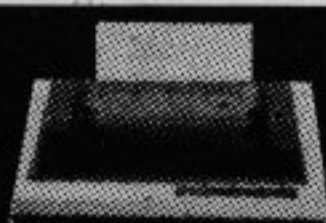
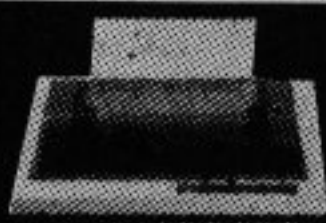
PRINTERS AT UNBEATABLE PRICES



EPSON RX80	£275+VAT
EPSON FX80	£365+VAT
STAR 510	£299+VAT
STAR 515	£389+VAT
CP80	£299+VAT

THE NEW 'STAR' AND 'CP' PRINTERS –
AS GOOD AS EPSON

STAR & EPSON – THE BEST ON THE MARKET.



All printers carry a 1 Year Guarantee and come with paper. Shipment is by TNT Overnight Express to your door – Please add £7+VAT carriage.

Payment by Cheque, Access, Visa etc.
All prices Apply to 31st July 1983.

Shipments throughout UK. We can
export to most countries in the world.

Please phone for Access or Visa
buying details.



**IMMEDIATE
DELIVERY.**

Micro-Spares

We cannot and will not be beaten on Price!

Note our change of address

104-106 Hanover Street, Edinburgh EH2 1DR
031-226 3345

MICROWAVE

Educational Utility Software for the BBC Microcomputer

■ GRAPHICS AID PACK

Two menu driven programs, an A4 reusable draughting board, manual and pens.

Program 1 – TELETEXT PLANNER: Makes full use of Mode 7 text and graphics. Draw, save or load a screen, view a test screen. Text and graphics are entered directly from the keyboard and all control codes are via the function keys. Screens can be preplanned using the wipe-clean draughting board.

Program 2 – CHARACTER GENERATOR: Design and save your own characters. Observe, invert and reverse ASCII code patterns. Greek and Russian character sets are supplied in *EXEC format.

Graphics Aid Pack £8.95

■ INDEX

A fully documented, menu driven program for authors (and readers of unindexed books!). This utility allows the creation of an index with automatic alphabetic sorting. Options include; creating a new index, reading and amending the index file, printing and saving the final index. Data is protected from loss, e.g., pressing the break or escape keys. (Printer interface required for 32K Model A)

Index £6.95

■ DYNAMIC NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY

This useful program plots a high resolution (Mode 0) nmr line shape for a two site exchange with and without coupling. It gives a superb demonstration of the effect of the coupling constant on an AB spectrum. Hard copy of the spectrum onto EPSON printers is available as an option within the program. A 40 page manual is supplied, "Introduction to DNMR spectroscopy". (Manual available separately £2.95).

DNMR £8.95

■ LISTING SERVICE

Want a listing of your valuable program? We offer a very competitive service, e.g., for an &10 block from £0.95p.

Disc versions available – Add £3.00 to above price. Send SAE for descriptive leaflets on any program above.

All programs for Model B or 32K Model A, OS 0.1, 1.0 and 1.2

DEALER ENQUIRIES WELCOME

24 Belford Road, Stretford, Manchester M32 0DL.

Build up your software library fast! – with
GANYMEDE Software
FOUR 'CLASSIC ARCADE GAMES' FOR THE BBC MICRO MODEL B
POC-MAN – INVADERS – BREAK-OUT – TENNIS

Yes, four full colour action-packed games, with high resolution graphics and superb sound effects, using either keyboard or joystick controls. All program sections using high speed dynamic graphics are written in **super-fast machine code**, and will provide hours of fun and excitement. As well as faithfully reproducing these famous games, the programs incorporate many improvements, made possible by the power of the BBC Micro, such as pre-selectable skill levels and increasing speed. And all for the price you would usually expect to pay for only one of these professionally produced software gems. Only **£9.95** (cassette) or **£11.95** (disc)

EXPERIMENTS IN ARTIFICIAL INTELLIGENCE (Models A & B)

You've seen some similar programs in the famous 'Horizon' program, now let your BBC Micro amaze (or even scare) you with its abilities, and introduce you to the fascinating science of Artificial Intelligence. This cassette (or disc) contains no fewer than **seven BASIC source programs**, and is intended to provide you with an opportunity to gain an insight into A.I. by further development work on the programs, which are all written in a well structured readable way with this purpose in mind. We recommend the purchase of these programs with the book, by Californian A.I. expert John Krutch, which explains how the programs work and is packed with ideas for further improvements.

Only **£9.95** (cassette) or **£11.95** (disc)

"Experiments in Artificial Intelligence" by John Krutch **£8.34**

All programs compatible with 0.1, 1.0, 1.2 O.S. All prices include VAT and P&P.

Trade enquiries welcome: 30% commission paid for original programs.

Send cheques PO's etc. to:

GANYMEDE SYSTEMS LTD.,

Huntsmans Walk, Rugeley, Staffs. WS15 2SN.

24 hour Access orders: **08894 78333**

Simonsoft

Specialists in High Quality Software for
the BBC Microcomputer

DISASSEMBLER (A/B) – a 'smart' disassembler that will generate fully labelled assembly listings of any machine code program – data is automatically differentiated from code and displayed together with its ASCII equivalent – the assembly listing can be saved in *EXEC format and subsequently incorporated into user programs – supplied with full instructions.

Without doubt the most powerful and flexible disassembler available
Disassembler £7.95

EMULATOR (B) – a new concept in machine code programming tools! Emulator is a machine code INTERPRETER which allows you to write and debug machine code as easily as BASIC – fully compatible with disassembler so that disassembled programs can be altered and 'emulated' – features single step, breakpoints register display, edit modes, data display mode etc etc – since the machine code is interpreted there is full protection from errors. Probably the most useful machine code programming tool.

Emulator £8.45

BASIC GOODIES (A/B) – a set of useful BASIC debugging routines saved in *EXEC format and fully documented – includes PROC/FN LISTER which lists the lines where procedures and functions are defined together with name, parameters etc – VARIABLE LISTER displays the current values of all or selected variables; very useful for debugging and demonstrations – SUPER REPORT intercepts BASIC errors and returns the message in a string variable so that error messages can be more flexibly reported – and more besides.

Basic Goodies £5.95

Prices are fully inclusive (for disc version add £3.00 and state single or double density)

All programs are fully guaranteed and OS 0.1 to 1.2 compatible.

DEALER ENQUIRIES WELCOME

Simonsoft

Front Street, Topcliffe, North Yorkshire, YO7 3RJ.

Electronequip

(Authorised BBC Dealer, and service centre)

NEW PRODUCTS

Utility Disc for BBC

Contains VER FORM35, FORM40 and FORM80. Cost £9.95

BBC Sparkjet Printer

New quiet printer for BBC. Friction and tractor feed 80cps. Cost £379.50

Torch Z80 Disc Pack

800K dual disc drive plus Z80 processor with CMP compatible operating system. Cost £897.00

TORCH Computer

800K to 21.4M disc drives. High res. colour monitor. Plus autodial modem. From £2,795.00 + VAT

NEW Epson FX80

FX80 160cps printer in stock. Friction and tractor feed + proportional spacing. Cost £458.85

Large stocks of software for BBC and Atom, Business, Games and Educational. Send for comprehensive list.

BBC 2	BBC Model B Micro Computer	399.00
BBC 3	BBC Model A Micro with 32K	333.50
BBC 4	BBC Model A Micro with 32K and VIA	339.50
BBC 5	BBC Model B with Disc Interface	469.00
BBC 6	BBC Model A with Econet Interface	356.00
BBC 7	BBC Model B with Econet Interface	456.00
BBC 8	BBC Model B with Disc & Econet Interface	526.00
BBC 21	BBC Model A to B Upgrade	99.82
BBC 28	Econet Upgrade for BBC	92.00
BBC 23	BBC Acorn Memory Upgrade for Model A	34.50
BBC 27	Disc Upgrade for BBC B (inc. fitting)	92.00
BBC 30	BBC 14" Colour Monitor	287.50
BBC 33	Sanyo SM12N Green Monitor 15MHz	90.85
BBC 34	BMC 12E Green Monitor 18MHz	113.85
BBC 35	Karga K12A 12" Orange Monitor	129.95
BBC 41	BBC Single 100K 5.25" Disc Drive (AND01)	265.00
BBC 43	BBC Dual 800K 5.25" Disc Drive (AND02)	803.85
BBC 44	Single Disc Drive (100K) for BBC (Teac)	205.85
BBC 45	Single Disc Drive (200K) for BBC (Teac)	263.35
BBC 46	Single Disc Drive (400K) for BBC (Teac)	343.85
BBC 47	Dual Disc Drive (200K) for BBC (Teac)	411.70
BBC 48	Dual Disc Drive (400K) for BBC (Teac)	526.70
BBC 49	Dual Disc Drive (800K) for BBC (Teac)	687.70
BBC 50	Epson FX80T 160cps Printer	458.85
ATM 2	Acorn Atom assembled 12K ram	184.00
ATM 26	Atom New Power Supply 1.8A	9.66
ATM 21	Floating Point ROM for Atom	21.85



14" Colour Portable Monitor/TV

This Monitor/TV is not a modified television as many TV/Monitors are, but a 14" Monitor/TV which has been designed to perform both functions. It has RGB and Composite video and sound. An RGB cable for a BBC is supplied as standard.

Cost £259.90

Trade enquiries welcome

Large stocks. Prices inclusive of VAT. All prices inclusive of postage except micros 3.00.

All Upgrades etc. are fitted free of charge and the computer fully re-tested. Access and Barclaycard Welcome.



**ACORN
COMPUTER**

Electronequip

BBC

36-38 West Street, Fareham, Hants

(0329) 230670

AEROSPACE SYSTEMS DEVELOPMENTS LTD

NEW PRODUCTS FOR THE BBC MICRO

HARDWARE

1. Biomedical amplifier 2 channel instrumentation amplifier, opto-coupled for maximum safety. Measures all usual biomedical functions. Plugs into analog socket. £20.00

2. Extender board. Plugs into vacant ROM socket, allowing either an extra 16k of RAM or up to 64k of EPROM £18.50

3. Eprom programmer. Automatic copying and programming of 2k and 4k single rail chips. RS423 or 1Mcs operation £60.00

4. Eprom eraser. Erases up to 16 chips. Timer version available. Safety switch £20.00 With Timer ... £25.00

5. Alarm Unit. Protect your valuable equipment with our sonic alarm. 110dB at 3 metres. This is ABSOLUTELY SHATTERING!! Mains and integral NiCad battery operated. False alarms cause operation for one minute only, with auto reset £56.00

6. Cables. Cassette leads (state termination required) £2.00
Printer cables (state printer type) £10.00

SOFTWARE AND SERVICES

1. Wordprocessor. Tape based 4k program, offering fast operation with sort and merge, insert and closeup, search and replace, justification, line length up to 240, infinitely variable page length. Cassette and manual £5.75

2. Mailer. Tape based mailing list program, Auto tape search for named records, which may be of any length up to 240 characters. Sort and merge, save and load all or part of lists. Very fast operation. Cassette and manual £5.75

3. Utilities. A cassette containing various utility programs such as screen print, screen save, a disassembler, string and integer sort, tape bug fix, bad program fix, graph plotter (up to 5 curves). Cassette £5.75

4. Tape and disc copying, printing. Fast, professional copying of cassette and disc. Prices on application, but around 40p per single sided cassette for quantities up to 500, this includes labels and plastic box. Post and packing extra. (£2.50 up to 50 off, £1.00 for each extra 75 off).
Printing service. Confidential service using Epson and letter quality printers. Prices £2.50 per 2,000 words Epson, £3.50 per 2,000 words letter quality. Tapes or disc must be written using our Wordprocessor or "Wordwise".

5. Good programs required.
We pay 40% royalties on good programs, which need not be games. You retain copyright.

Send cheques and postal orders to:

ASD Ltd., 30 West End, Launton, Bicester, OXON.

(No cheques cashed until goods are dispatched)

Except where stated, prices include VAT and postage.

It's oil in the game...

SLICK is an interactive computer simulation based on the conservation game of the same name. It is designed to enable students of various ages and abilities to investigate the methods of dealing with oil pollution around the fictional coastal town of Inverlochen.

For advanced students it could form the basis of an examination into decision making in the modern world, or an introduction to logical thinking.

For top juniors it could be the centrepiece of a project on oil and pollution, giving an introduction to simple map reading.

Initially a map appears with the title of the program. Then the map reappears together with a key of the various features. The whole of the graphics are produced in Mode 7 (teletext mode) and are excellent.

This is followed by a brief introduction and details of the methods available to combat an oil spillage from a tanker, such as booms and dispersants, with different costs for each. Further details are provided on data sheets which can be copied for class use.

A total of £5,000 can be allocated between the methods. The pupil is then presented with a 100 tonne oil spillage which has to be dealt with.

The initial map co-ordinates of the slick are given on the screen, together with windspeed and direction. The student has to estimate the new position of the oil slick before any other choices can be made.

If the estimate is correct, then various options are open depending upon the methods of dispersal chosen. For example, a tug may be loaded with dispersant units, or booms may be moved to protect sections of the coast.

There are various conditions attached to the options. For example, only two dispersant units can be loaded at a time before the next slick position has to be estimated.

To make things a little more difficult, a clock is displayed on the screen and

Slick (BP Educational Service)

unless moves are made within a certain time limit the message "Time-up" is given.

The slick moves slowly towards the coastline and each method takes a certain time to implement (times are given in the data sheets).

It is impossible to deal with all of the oil and eventually the message "Oil Ashore" is displayed, followed by a detailed breakdown of the score achieved.

After discussion of the score the

Music Synthesiser (Bug Byte)

"YOU are well advised to read the BBC section on envelope before using the Music Synthesiser," states the opening section of documentation – and very good advice it is too.

Unless the user has a very good knowledge of music and, in particular the SOUND and ENVELOPE commands in BBC Basic, it is unlikely that he will be rapidly producing long musical pieces scored for three instruments.

He is not helped by rather poor, and sometimes unclear, screen prompts (for example Silent Inst'mt Rep number or note) which could be somewhat improved.

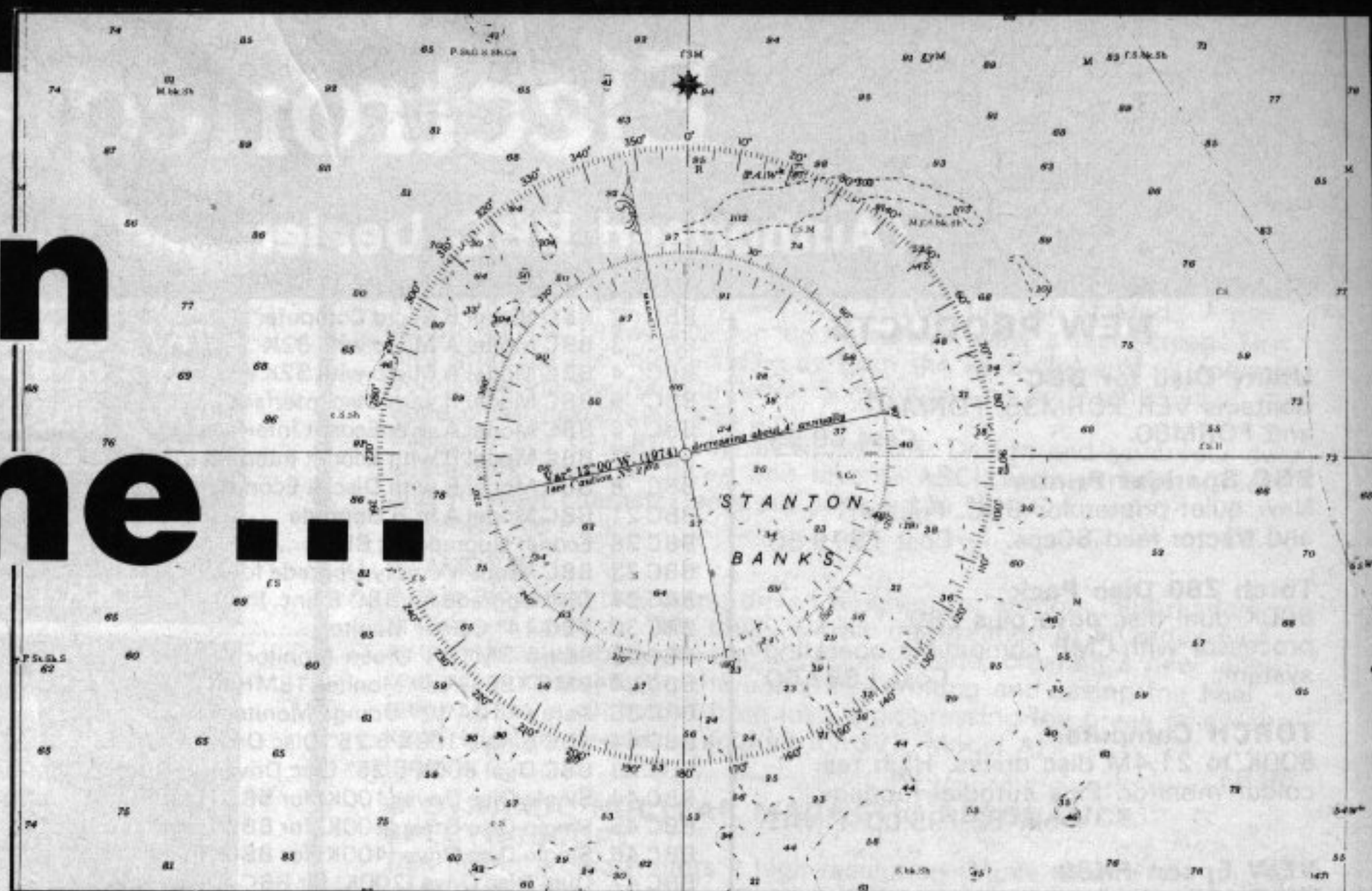
In several places the command displays are rather confusing because CLS is not always used before overprinting with new information at the top of the screen.

The written documentation is also rather poor. I found that I had to read

pupils can then select from the menu one of several options and repeat the game, leave the program, or make a copy of the program.

The program is supplied on tape with copies at 1200 and 300 baud. A teachers' guide and copies of the briefing sheet, data sheets and map are also provided.

All written materials and the program may be copied for use by a class of students and a sheet of program notes is also provided with instructions on how to use the program with a Model A machine or with a disc based system. **Mike Shaw**



Budding

and reread some sections several times while running the program in order to try and clarify the instructions. Particularly difficult to follow is the section on "Inserting and editing notes and directives" (2b) and the description of Sections (2d)(3b).

The program uses a Mode 7 text display with good use of colour and is on the whole quite well protected against incorrect keyboard input (generally the input line is overprinted and the user is warned with a gentle beep).

In a typical first run, the user would enter the Edit Envelope mode and define some instruments. Up to 16 can be defined with OS 1.2, although obviously only four can be used at any one time. In Edit Envelope mode several options are available on the soft

Missiles, meteorites and small green aliens

THIS is an amazingly addictive arcade game which can be played with a joystick or keyboard. The keyboard version though can make the game even more frustrating, and doesn't really do it full justice.

The aim is to fly your rocket ship through five different landscapes, each of which has its own hazards designed to make things as difficult as possible for you.

The first scenario is a lurid purple mountainous terrain containing fuel tanks which you must destroy to maintain your supplies, servicing units – which don't fight back fortunately – and ground sited missiles which zoom up at you with fatal consequences unless you can dodge or shoot them.

Despite all this, the first stage is designed to lull you into a false sense of security, because next comes the Cavern.

It wouldn't be too bad if you just had to navigate through it without crashing into overhangs and outcrops, but unfortunately the Cavern is inhabited by small green aliens called Phizzers

Rocket Raid (Acornsoft)

which are remarkably adept at smashing into you.

You can shoot them, but don't forget about the narrow section at the end of the Cavern!

If you do manage to get through the Cavern don't relax, because next come the Meteorites. You can't destroy these, so you just have to dodge them while trying desperately to bomb the fuel tanks below you.

Fortunately, this section is not too bad and you'll soon get through to the Skyscrapers. Once again there are ground missiles here, so you have to fly above and between these as they take off, until eventually, if you're lucky, you reach the Maze.

This is the most difficult section of all. After many hours of trying I still

haven't got far into it, but no doubt after a few more weeks of playing through the night its secrets will be revealed.

Each game gives you three ships, and you can earn more if you score enough points. Unfortunately each time you get destroyed you go right back to the beginning of the section you were in.

This is quite heartbreaking when after many attempts you are almost at the end of the Cavern!

Conclusion: This is a superb game. The sound effects are of an excellent quality, and the joystick control allows you to shoot bullets and drop bombs with a single button, which gives you a small advantage over the terrors of the enemy's many different methods of attack – even if you never quite manage to completely overcome them.

Jane Jackson

Bachs beware

keys as each envelope is being defined – the envelopes can be named (f3) and listed (with command DISPLAY), represented graphically (f2) and heard as music (f0) or noise (f4) with a present frequency (f5).

Once the envelopes are set, the user can enter Edit Channel mode. Rather tediously he then has to enter notes (or directives such as 'R' for repeat a section) in sequence, channel by channel.

Conventional music notation is used to enter the notes, example C#4 – 'C' sharp, 4th octave, where the octaves "wrap round". That is A (octave 4) follows G (octave 3).

Finally in Play Mode, the entire piece can be played through from note 1, or sections (previously defined, for example as section 1 – notes 1 to 32; section 2 – notes 33 to 64) can be

played in any sequence.

This is useful of course for playing a tune whose structure is, say verse, chorus, verse, chorus, chorus repeat.

Unfortunately if your composed piece doesn't contain many notes, there is quite a long pause after they have been played while the program examines the rest of an empty array. However I found that pressing Return at this point quickly returns control to the main menu ready to continue editing.

A very useful feature of Music Synthesiser is the option of saving a file containing the instrument envelopes and channel notes which you have defined.

In conclusion, quite a useful program, but not recommended for the beginner. It could easily be improved

by increasing user friendliness, tidying up the screen display and reducing the number of key presses required, for example by increased use of GET or INKEY. It would also have been useful to have included an example music data file.

The rather high price of the package is in my view justified only by the inclusion of the delightful Auto-Composer program. A few inputs to define parameters such as tempo and rhythm, choose between two and six musical chords and give a weighting to each, and away goes the computer composing ad infinitum.

Far from being random and discordant, some of the pieces it produces are quite intelligent. A musician with a knowledge of chord structures would have a whale of a time with this one. Pity about the spelling though – cord, syncapation and sink!

N.R.M. Smith

HARDWARE

PRINTERS

- MM8078 1.2 MB
- MM8037 Seikosha EP100
- MM8035 Seikosha GP250
- MM8081 NEC PC 8023 Printer (D/M)
- MM8036 Epson MX100
- MM8079 Epson RX-80 Printer
- MM8080 Epson FX-80 Printer 160cps
- MM8039 Epson Jet Printer
- MM8038 Smith Corona D/Wheel
- MM8040 Tec Starwriter
- MM8082 Tec Starwriter Ribbon

DISK DRIVES

- MM8034 5 1/4" 100K Single
- MM8033 5 1/4" 160K Single
- MM8032 5 1/4" 160K Single

DISK DRIVES

- MMB056 Disk Drive 100K Single
- MMB057 Disk Drive 200K Single
- MMB058 Disk Drive 400K Single
- MMB059 Disk Drive 800K Dual
- MMB060 1 Drive Cable for above
- MMB061 2 Drive Cable for above
- MMB062 720 Disk Pack

MONITORS
MMB015 RGB Colour Monitor Stand
MMB016 RGB Colour Monitor H/Res
MMB020 Plinth for RGB Monitor
MMB017 RGB Cable
MMB018 12" Green Monitor
MMB019 12" Amber Monitor

GRADE KITS
Grade (Fitted)
(Kit)
(1)

UPGRADE KITS

- MMB021 A to B Upgrade (Fitted)
- MMB022 A to B Upgrade (Kit)
- MMB023 Memory Upgrade (Kit)
- MMB024 Printer I/O (Kit)
- MMB025 Analogue (Kit)
- MMB026 Serial I/O & RGB (Kit)
- MMB027 Expansion Bus (Kit)

DISKS AND CABLES

- Cable Assembled
- Connector/Cable

PLUGS AND CABLES

- MMB020 Expansion Cable
- MMB027 Parallel Cable Assembly
- MMB028 Parallel Cable Assembly
- MMB029 User Port Connector/Cable
- MMB030 Analogue Plug & Cable
- MMB031 5 Pin DIN
- MMB032 6 Pin DIN
- MMB033 7 Pin DIN
- MMB034 Bus Connector

DISKS

- MMB035 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB036 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB037 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB038 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB039 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB040 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB041 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB042 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB043 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB044 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB045 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB046 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB047 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB048 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB049 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB050 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB051 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB052 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB053 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB054 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB055 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB056 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB057 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB058 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB059 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB060 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB061 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB062 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB063 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB064 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB065 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB066 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB067 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB068 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB069 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB070 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB071 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB072 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB073 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB074 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB075 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB076 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB077 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB078 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB079 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB080 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB081 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB082 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB083 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB084 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB085 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB086 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB087 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB088 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB089 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB090 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB091 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB092 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB093 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB094 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB095 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB096 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB097 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB098 5 1/4" 5 1/4" Disks (10) D/Side D/D
- MMB099 5 1/4" 5 1/4" Disks (10) S/Side S/D
- MMB100 5 1/4" 5 1/4" Disks (10) D/Side D/D

STORAGE
MMB041 5 1/4" Disks (10) S/Side
MMB083 5 1/4" Disks (10) D/Side D/D
MMB042 Computer Cassette Tapes

COVERS
MMB043 Computer Dust Cover
MMB044 Disk Drive Dust Cover

ACCESSORIES
MMB045 Cassette Recorder
MMB046 Flowchart Stencil
MMB047 Library Binder (2000)

ACCESSORIES
 MMB045 Cassette Recorder
 MMB046 Flowchart Studio
 MMB047 Disk Library Case
 MMB048 Paper 9 1/2" x 11" (2000)
 MMB049 Paper 15 5/16" x 11" (2000)
 MMB085 Computer Work Station
 MMB088 Computer Work Station
PERIPHERALS
 Tablet (Cass's)
 Disk (Disk)

PERIPHERALS

- MMB085 Graphics Tablet (Case's)
- MMB088 Graphics Tablet (Disk)
- MMB050 Light Pen
- MMB052 A/D Converter
- MMB053 128K RAM Pack
- MMB054 Cooling Fan

8 MICRO USER July 1

Local Authorities and Government Departments. Seminars

3.45

MMS174 Speed & Light
MMS175 Density & Circuit
MMS176 Chemical Analysis
MMS177 Chemical Structures

(Acornsoft)
(Acornsoft)
(Acornsoft)
(Acornsoft)
(Acornsoft)
(Acornsoft)
(Acornsoft)
(Acornsoft)

11.90
11.90
13.80
13.80
13.80
11.90
59.80
99.85
11.50
11.50
11.50
11.50

MMS086 Polar
MMS070 Fruit
MMS046 Micro
MMS047 Space
MMS048 Chess
MMS206 Music
MMS207 City D
MMS225 Space
MMS226 Galax
MMS227 BBC M
MMS235 Back
MMS229 World
MMS230 Word
MMS231 Anim
MMS232 Tim

**Overseas
dealers
and distributors
enquiries welcomed.
Exports a
speciality**

**Local
Authorities and
Government Departments.
Orders welcomed.
Educational Seminars
given.**

MMB086 Speaker De-buzzer

MMB087 Voltmeter A & D

BOOKS

MMB060 ALP For BBC Computers

MMB061 30 Programs for BBC

MMB062 Programming the 6502

MMB063 6502 Applications

MMB064 BBC Micro Revealed

MMB065 Let Your BBC Teach You

MMB066 30 Hour Basic

MMB068 6502 Software Design

MMB069 Introduction Forth

MMB069 Intercover Forth

MMB070 Practical Progs for 6502

MMB071 Practical Progs for BBC & Altos

MMB072 The Computer Book

Prog for BBC

Camps Play

from BB

MMB073 Easy P
MMB074 Games BBC C
MMB075 Basic Programming
MMB076 Forth Programming
SOFTWARE

MMS053 Arcadian
MMS054 Snapper
MMS055 Meteors
MMS056 Creative Graphics
MMS057 Tree of Knowledge
MMS058 Business Games
MMS059 Peeke-Computer
MMS060 Algebraic Manipulation
MMS061 Monsters
MMS062 Planetoid
MMS063 Arcade Action
MMS064 Desk Diary
MMS065 Philosophers Quest
MMS066 Lisp
MMS067 Graphs and Charts
MMS069 Cube Master
MMS147 Castle of Riddles
MMS149 Forth
MMS150 Rocket Raid
MMS151 Sphinx Adventure
MMS152 Sliding Block Puzzles
MMS163 Chess
MMS164 Super Invaders
MMS165 Missile Base
MMS166 Snooker
MMS167 Starship Command
MMS168 Countdown to Doom
MMS169 Sentence Sequencing
MMS170 Word Sequencing
MMS171 Missing Signs
MMS172 Number Balance
MMS173 Word Hunt

(Micro Man)	3.45
(Micro Man)	28.75
	8.95

(Micro)	8.95
(I. Bimbaum)	4.95
(C.J.E.)	10.75
(R. Zaks)	10.75
(R. Zaks)	7.95
(J. Ruston)	6.45
(T. Hartnell)	5.95
(C. Prigmore)	10.25
(L.J. Scanlon)	8.25
(K. Necht)	10.25
(T. Hogan)	14.95
(W. J. Weller)	
ton-Davis)	5.95
(BBC)	6.75
(E. Deeson)	5.95
(T. Hartnell)	5.95
(N.&P. Cryer)	5.95
(Sams)	12.50

[illegible]

11.90

MMS174 Speed & Light
MMS175 Density & Circuit
MMS176 Chemical Analysis
MMS177 Chemical Simulations
MMS178 Chemical Structures
MMS179 Jars
MMS180 Microtext
MMS181 View ROM (inc Manuals)
MMS182 BCPL (ROM, Disk-Manuals)
MMS183 Arcadians
MMS184 Super Invaders
MMS185 Starship Command
MMS186 Sphinx Adventure
MMS187 Philosophers Quest
MMS188 Number Balance
MMS189 Word Hunt
MMS190 Speed & Light
MMS191 Density & Circuit
MMS192 Chemical Analysis
MMS193 Chemical Simulations
MMS194 Chemical Structures
MMS195 Jars
MMS196 Lisp
MMS197 Forth
MMS198 Microtext
MMS199 Word Sequencing
MMS200 Missing Signs
MMS201 Sentence Sequencing
MMS202 Rocket Raid
MMS203 Monsters
MMS204 Snapper
MMS205 Meteors
MMS206 Planetoid
MMS207 Creative Graphics (Book)
MMS208 Graphs & Charts (Book)
MMS209 Lisp (Book)
MMS210 Graphs & Charts (Book)
MMS211 Forth (Book)
MMS212 View Guide (Book)
MMS213 Into View (Book)
MMS214 BCPL Manual (Book)
MMS215 Early Warning
MMS216 Roadrunner
MMS217 Planes
MMS218 Pharaohs Tomb
MMS219 Frogger
MMS220 Lunar Lander
MMS221 Tower of Altos
MMS222 Painter
MMS223 Options Timetable (C)
MMS224 Record Changer
MMS225 Word Processor
MMS226 Home Finance
MMS227 Early Learning
MMS228 Music
MMS229 The Computer Program Vol.1 (BBC)
MMS230 The Computer Program Vol.2 (BBC)
MMS231 Painting
MMS232 Drawing
MMS233 Games of Strategy
MMS234 Fun Games
MMS235 The Computer Book
MMS236 Spacewarp
MMS237 Golf
MMS238 Dragon Quest
MMS239 Airlift

11.90	MMS086	Polaris	(Bug-Byte)
11.90	MMS070	Fruit Machine	(Bug-Byte)
13.80	MMS048	Microdoby	(Bug-Byte)
13.80	MMS047	Space Pirates	(Bug-Byte)
13.80	MMS048	Chess	(Bug-Byte)
13.80	MMS206	Music Synthesis	(Bug-Byte)
13.80	MMS207	City Defence	(Bug-Byte)
11.90	MMS225	Space Invaders	(Bourne E.S.)
50.80	MMS226	Galaxy Wars	(Bourne E.S.)
99.95	MMS227	BBC Multitile	(Bourne E.S.)
11.50	MMS235	Backgammon	(Bourne E.S.)
11.50	MMS230	World Wise	(Bourne E.S.)
11.50	MMS231	Wordhag	(Carlton Computing)
11.50	MMS232	Animal/Vegetable/Mineral	(Chalksoft)
11.50	MMA233	Happy Numbers	(Chalksoft)
11.50	MMS233	Timeman	(Chalksoft)
15.35	MMS154	Morse Tutor	(Chalksoft)
15.35	MMS140	Pascal	(Chalksoft)
15.35	MMS141	Angle	(Chalksoft)
15.35	MMS142	Inkosi	(C.J.E.)
17.25	MMS143	Invisible Man	(Computer Concepts)
17.25	MMS144	Letters	(Computer Concepts)
17.25	MMS145	Metrics	(Computer Concepts)
15.35	MMS146	Sequences	(Computer Concepts)
19.90	MMS155	30+ Progs for the BBC	(Computer Concepts)
19.90	MMS069	Logo II	(Computer Concepts)
50.80	MMS073	Kitch-N-Like	(Computer Concepts)
15.35	MMS074	Spacehawks	(CSL Microdata)
15.35	MMS075	Asteroid Belt	(Fisher Marriott)
15.35	MMS076	Chess	(Fisher Marriott)
11.50	MMS158	Wordwise	(Fisher Marriott)
11.50	MMS205	Snake	(Fisher Marriott)
11.50	MMS045	Beebspell	(Gem Software)
11.50	MMS008	Starsstar	(Gem Software)
11.50	MMS009	Tablestar	(Gem Software)
7.50	MMS156	War & Peace Numbers	(Gem Software)
7.50	MMS157	War & Peace Tables	(Gem Software)
7.50	MMS077	Anglezap	(Golem)
7.50	MMS078	L Trap	(Golem)
2.50	MMS079	Take Off	(Golem)
2.50	MMS080	Graph Capers	(Golem)
15.00	MMS081	Monte Carlo	(Golem)
6.90	MMS004	Educational-1	(H & H)
6.90	MMS159	Educational-2	(H & H)
7.99	MMS160	Superlife	(H & H)
7.99	MMS161	Katakombs	(H & H)
7.99	MMS162	Utilities	(H & H)
6.90	MMS234	Early One	(H & H)
6.90	MMS235	Early Two	(H & H)
6.84	MMS236	Early Three	(H & H)
18.40	MMS237	Billiards	(I.J.K.)
23.00	MMS238	Tess	(I.J.K.)
18.40	MMS239	Alphabeta	(I.J.K.)
10.00	MMS240	Signals & Race	(I.J.K.)
10.00	MMS241	Shape & Race	(I.J.K.)
10.00	MMS113	Invaders	(I.J.K.)
10.00	MMS114	Mutant Breakout	(I.J.K.)
10.00	MMS115	3-D Maze	(I.J.K.)
10.00	MMS116	Beeb Beep	(I.J.K.)
10.00	MMS117	Hyperdrive	(I.J.K.)
10.00	MMS118	Super Hangman	(I.J.K.)
10.00	MMS119	Flags	(I.J.K.)
6.75	MMS120	Stratobomber	
9.00	MMS121	Family Games	
11.50	MMS122	Atlantis	




**Market
your own software
through us**
Write with
details



NEW!

**Robustly designed
computer
work station**

£138.00



Post and Packing
only £1 per item software
£2 per item hardware

CODE	ITEM	QTY	£	p	£	p
CREDIT CARD No.			SUB TOTAL			
NAME		BARCLAY/ACCESS		P & P		
ADDRESS				TOTAL		

**ECONET?
ASK US**

MICRO MANAGEMENT

32 Princes Street, Ipswich, Suffolk. Phone: (0473) 59181

Part five of MIKE BIBBY'S introduction to programming

THERE is an assortment of new ideas this month, which should greatly increase the scope of our programs.

Firstly, if you cast your mind back to last month, we saw that the INPUT statement enables the BBC Micro to ask for information when a program is running.

When the micro encounters a line such as:

```
10 INPUT name$
```

it halts the program, puts a prompt ("?) on the screen and waits for a response. You then type in what you wish name\$ to be and press Return, when the program continues with the new value of name\$.

We also saw that it is sensible to print a message on the screen before INPUT to indicate the kind of response required.

Last month we used techniques such as:

```
10 PRINT "How old are you";  
20 INPUT age
```

Actually we can incorporate such messages in the INPUT statement, as in the following:

```
10 INPUT "How old are you",age
```

Look carefully how it is done:

- ☐ You insert the message between INPUT and the variable.
- ☐ The message is in quotes.
- ☐ There is a comma between the final quotes and the variable.

Using this technique, last month's multiplication program would become:

```
10 REM *** PROGRAM I ***  
20 MODE 6  
30 INPUT "First Number",first  
40 INPUT "Second Number",second  
50 PRINT;first " multiplied by ";se  
   cond " is "; first * second
```

Program I

And now for something completely different! You should remember programs such as:

```
10 PRINT "HELLO"  
20 GOTO 10
```

This type of program, which endlessly repeats itself, is called an unconditional loop. As we learned, it is not a particularly useful thing to do in a program, and we'll see how to do something about it this month.

Firstly, though, let's look at another way of obtaining an endless loop:

```
10 REPEAT  
20 PRINT "HELLO"  
30 UNTIL FALSE
```

If you run it, you'll see that it gives exactly the same output as the previous example, repeatedly printing out HELLO until you press escape.

This sort of loop is known as a REPEAT . . . UNTIL loop. All the lines between the REPEAT and the UNTIL are repeated until a certain state in the program, known as the condition, is reached.

For instance, here is a 'program' to read a book:

```
REPEAT  
  read next page  
UNTIL no more pages
```

In this case the finishing condition is 'no more pages'.

Now the last program we ran simply said UNTIL FALSE, so the condition the loop was testing for, to see if it was finished, was FALSE.

Exactly what this means we'll ignore for the moment. Suffice it to say that, since we haven't given the micro any-

thing that could possibly be FALSE, it isn't likely to find anything to meet the finishing condition, so it will keep on repeating indefinitely.

It isn't so much an unconditional loop as a loop with an impossible condition.

Program II uses a REPEAT . . . UNTIL loop with a condition: lines 40

```
10 REM *** PROG II ***  
20 MODE 6  
30 REPEAT  
40 PRINT "This is a REPEAT... UNTIL  
   loop"  
50 INPUT "Do you wish to finish",A$  
60 UNTIL A$="YES"  
70 PRINT "Then I quit!"
```

Program II

and 50 are to be repeated until A\$="YES".

The effect of this is that the program keeps on printing out its message (line 40), then asks whether you wish to finish (line 50). Any reply to the question other than YES will cause the loop to be repeated.

If, however, you answer YES, the loop's condition, which was UNTIL A\$="YES", is fulfilled and the program is able to continue past to line 70.

Before we continue with REPEAT . . . UNTIL loops look at Program III. There's nothing here that should prove too difficult. Let's examine line 50 in detail:

```
50 new_number=number + 1
```

When the computer reaches this line, it takes the value of the number, adds

Now let's put some to work



one to it, and stores the result under the label `new_number`. That is, line 50 ensures that `new_number` is one higher than `number`.

Notice that the computer does the sum that appears on the right of the '=', then stores the result in the variable appearing on the left.

If you try Program IV, you'll see that it is based on Program III.

Can you see what's happening in line 50? Remember, we do what is on the right of the '=', then store the result in the variable on the left. So when the micro encounters:

```
50 number=number+1
```

it takes the value labelled by `number`, adds one to that value, then stores the result back in the variable `number`. In other words, line 50 increases the value of `number` by one.

Had line 50 read:

```
50 number=number+2
```

the value stored in `number` would have been incremented by two. Try it!

Now, let's get something clear: Mathematically,

```
number=number+1
```

does not make sense. How can a number be equal to itself plus one? It's like writing:

```
5=5+1
```

However, we are not using the '=' as an equals sign. We are using it to signify assignment – that is, we're using it to pin a label (or variable) onto something. When we write:

```
new_number=number +1
```

we are telling the computer to do the job on the right, that is, to add one to the value labelled by `number`, then to label the result of that number with the label on the left of '='.

The only reason that:

```
number=number+ 1
```

might seem confusing is that we are labelling the result of the calculation on the right with a label that's already been mentioned in that calculation.

That doesn't worry the micro, though. It's used to re-using the same label. That's why they're called variables – they keep varying!

Have a look at Program V. Line 50 is identical to that of Program IV. That is, it increases the value of the variable `number` by one.

However, the variable is part of a REPEAT . . . UNTIL loop. Hence no sooner has it incremented `number` (line 50), than it is printed out again (line 40), incremented again (line 50), printed (line 40) and so on.

The effect is that line 40 prints out a steadily increasing sequence of numbers.

This might be rather hard to see, since the screen will be scrolling rather quickly. To get round this I suggest that you add the following two lines:

```
25 VDU 14
```

```
65 VDU 15
```

These lines introduce the VDU drivers, a rather complex topic that we shall, for the moment, only touch on lightly.

The effect of VDU 14 in line 25 is to put the micro into paged mode. This means that rather than allowing the unrestricted scrolling of the screen, information is presented in screenfuls at a time, which remain on the screen until Shift is pressed, when the next screenful is delivered, and so on.

VDU 15 on line 65 simply ends the paged mode and returns you to normal scrolling.

Can you alter line 50 in Program V

so that `number` goes up in 2s, 4s or 10s? Could you, by altering lines 30 and 50, get the program to start at 1000 and count down in ones?

We can actually get the program to stop at a given number by altering the loop condition in the UNTIL statement. In Program V, try altering line 60 to:

```
60 UNTIL number=24
```

Is the final number printed on the screen 24 or not? If not, can you see why, and can you alter the program so 24 is the final number printed out?

```
10 REM *** PROG III ***
20 MODE 6
30 number=0
40 PRINT "number is ";number
50 new_number=number + 1
60 PRINT "new_number is ";new_number
```

Program III

```
10 REM *** PROG IV ***
20 MODE 6
30 number=0
40 PRINT "number is ";number
50 number=number + 1
60 PRINT "number is now ";number
```

Program IV

```
10 REM *** PROG V ***
20 MODE 6
30 number=0
35 REPEAT
40 PRINT "number is ";number
50 number=number + 1
60 UNTIL FALSE
```

Program V

You puts the signal in, you puts the signal out. Your micro does the hokey cokey and shakes it all about

You have a user port, so use it!

FOR the last two months we have been looking at applications involving the analogue input port. While there is a lot more to be done using it, I would like to add a little variety and switch attention to the user port.

With this you can put signals in and put signals out. The computer can then do the hokey-cokey and shake them all about.

With a digital port you can monitor switches and control devices, which will add another dimension to your computer.

The user port is one side of the 6522 VIA (Versatile Interface Adapter). It is in fact the B side, the A side being used to drive the printer.

The VIA is a quite remarkable device, capable of being used in many different modes. The B side consists of eight input/output lines and two control lines.

To those of you not familiar with computer electronics, it may be a little puzzling why I said input/output. Surely a connection must be either an input or an output? Normally, with logic circuits, I would agree with you. But with the VIA — and other specialised computer I/O devices — each data connection is capable of being either an input or an output. It can, however, only be one of these at any one time.

How does it do this trick? Well, the VIA is memory mapped into the address space of the microprocessor. That is to say, it appears as 16 consecutive memory locations, from &FE60 to &FE6F.

So at those addresses instead of there being normal memory there are the internal registers of the VIA.

Each register, and so each address, in this range controls some part of the behaviour of the VIA, and one of the registers determines whether a bit is an input or an output.

Fortunately you don't have to understand them all to be able to operate the user port. It will help, however, to have a little knowledge of binary and hexadecimal.

If these are unfamiliar, I suggest you read Bits and Bytes on Page 60, which should make it clearer.

The registers in the VIA affect the way it operates. At address location &FE60 is the data register for the B side of the VIA, and any input or output is channelled through this address. That is, any data transfer to the user port just needs to use that address to access the outside world.

As I said before, each bit can be either an input or an output, as dictated by the eight bits in the Data Direction

the number in hex.

To read or write to the user port we must read or write to the memory location &FE60. We can access this register in two ways — firstly by using the indirection operator "?", and secondly by an OSBYTE call.

The second method has the advantage of working when using the second processor and is recommended by Acorn. However, it has two disadvantages, first it is slower and second it only works with operating system 1.0 or later.

When considering which to use I asked myself, "How many people have a second processor anyway?" and, "If Acorn were that serious about OSBYTE calls why didn't they implement them from the first operating system?"

So in all my examples for the time being I will use the direct method, which is both quicker and easier to write. If you do want to convert the examples to run on the second processor then it is very easy and many articles have already appeared on how to do it. (*Note: Many more articles than second processors!*)

Having seen how to access the VIA from software we need physically to access the pins of the VIA. These are brought out to a 20 way IDC header, under the case.

The easiest way to access them is to use a 20 way socket (known as an insulation displacement connector)

By MIKE COOK

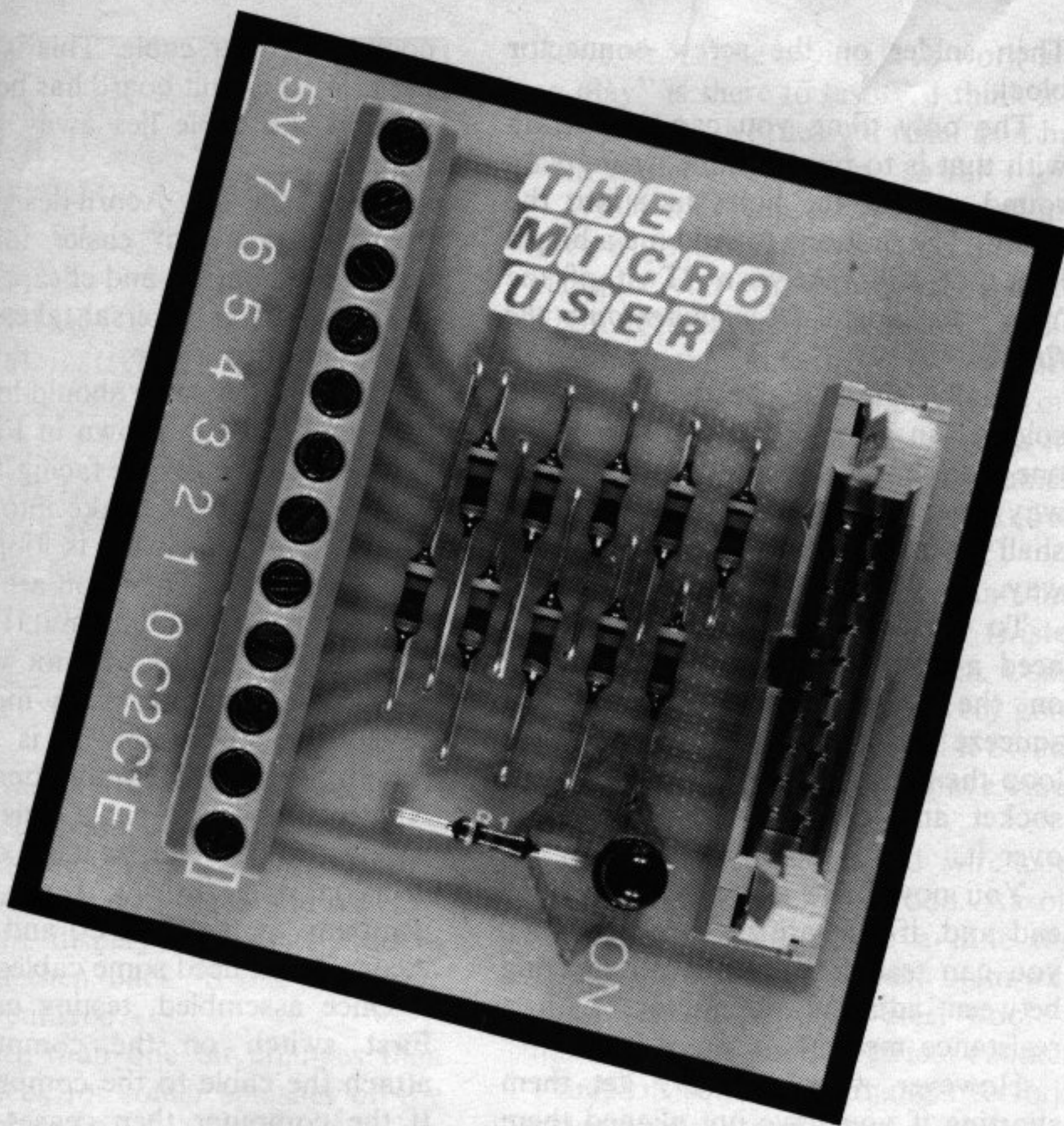
Register (DDR) for the B side (or port B).

The DDR is at address &FE62 and each bit in that register determines whether the corresponding bit in the Data Register, and hence the user port connection, is an input or an output. If bit 5 in the DDR is a one, then bit 5 in the Data Register will be an output.

Similarly, if bit 6 in the DDR is a zero, then bit 6 in the Data Register will be an input. In this way we can have any combination of inputs and outputs distributed over the eight bits.

As the number stored in address location &FE62 affects the configuration of each bit in the user port, you will see that it is very useful to express

THE BEEB BODY BUILDING COURSE



attached to a ribbon cable.

The cable is threaded through and then the whole assembly is squeezed in a vice. The sharp prongs in the socket cut through the insulation and grip the wires, thus making 20 joints at a stroke.

This is something that newcomers find hard to believe, but they really are as good and solid as if they had been soldered.

The other ends can be separated, stripped and soldered onto the external circuits.

However, I have found that while it is easy to say (and in my opinion to do) many people have difficulty in doing this neatly and in a way that does not short out any connections. Also, for every circuit a new socket and length of

ribbon cable has to be used.

Ribbon cable is expensive, and as all the connections are not always needed there is some waste that leads to an untidy job.

I pondered long over this dilemma and came up with the idea of a ribbon cable with a socket on each end connecting to a small printed circuit board that makes a transition to screw connections.

This has the advantage of being easy to connect to external circuits, and if

you wanted to leave it connected permanently to one circuit you could just obtain extra printed circuit boards and use the same ribbon connector.

In addition, the printed circuit board can label each user port connection so there is no danger of them getting mixed up. So I have designed a printed circuit board to do the job. Details of how to buy it are on the next page. Two packs are available:

The circuit for the printed circuit board is shown in Figure I. It is included for those of you who would like to make it up from your own components. As you can see, it is not very complicated as it is basically just a transition from one type of connector to another.

There is an LED to indicate that it is connected up correctly and that the power is on. Also on each signal line there is a resistor going to the +5 volt line. This is known as a pull-up resistor, and is needed when a line is used as an input.

If some active device is feeding the

Body Build Pack No. 1 consists of a printed circuit board, IDC header, screw terminal block, 11 resistors and an LED. Price £9.95, including VAT.

Body Build Pack No. 2 consists of two 20 way IDC sockets and 2ft of ribbon cable. Price £9.95, including VAT.

You need both packs to start with, but then if you want to do more work you need only buy another Pack No. 1, as you can use the same ribbon cable connector.

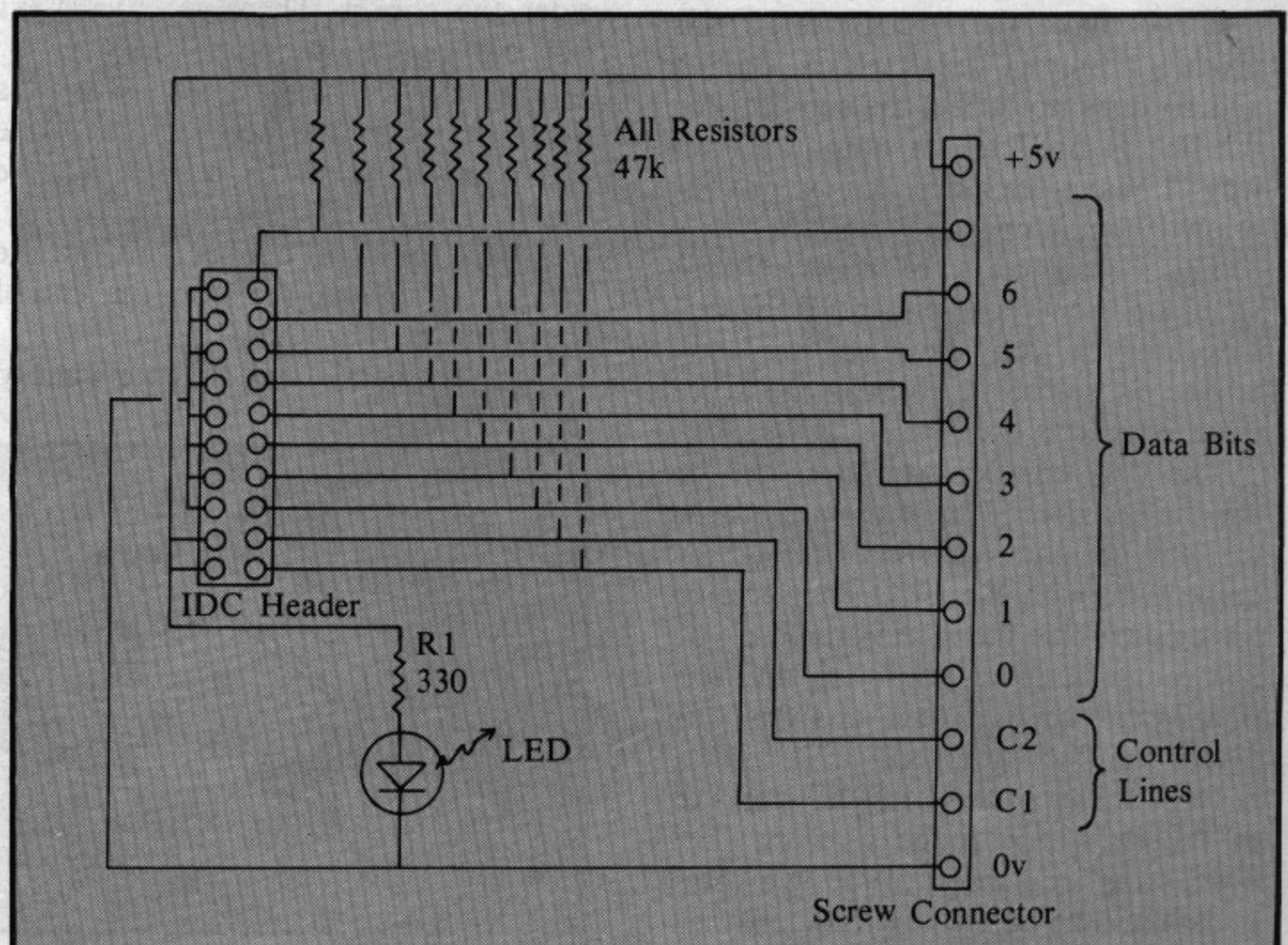


Figure I. The circuit of the Body Build Pack No 1 printed circuit board

From Page 83

input then a pull-up resistor is not needed as the appropriate voltage levels are generated by the device.

However, if a passive device, such as a contact closure in a switch, is feeding an input, it cannot generate any voltage to drive that input. In this case (see Figure II), when the switch is open circuit the pull-up resistor supplies enough current to produce a logic one on the input.

When the switch is closed, the input is connected to earth (0 volts line) and so a logic zero is produced on the input.

As only a very small current is

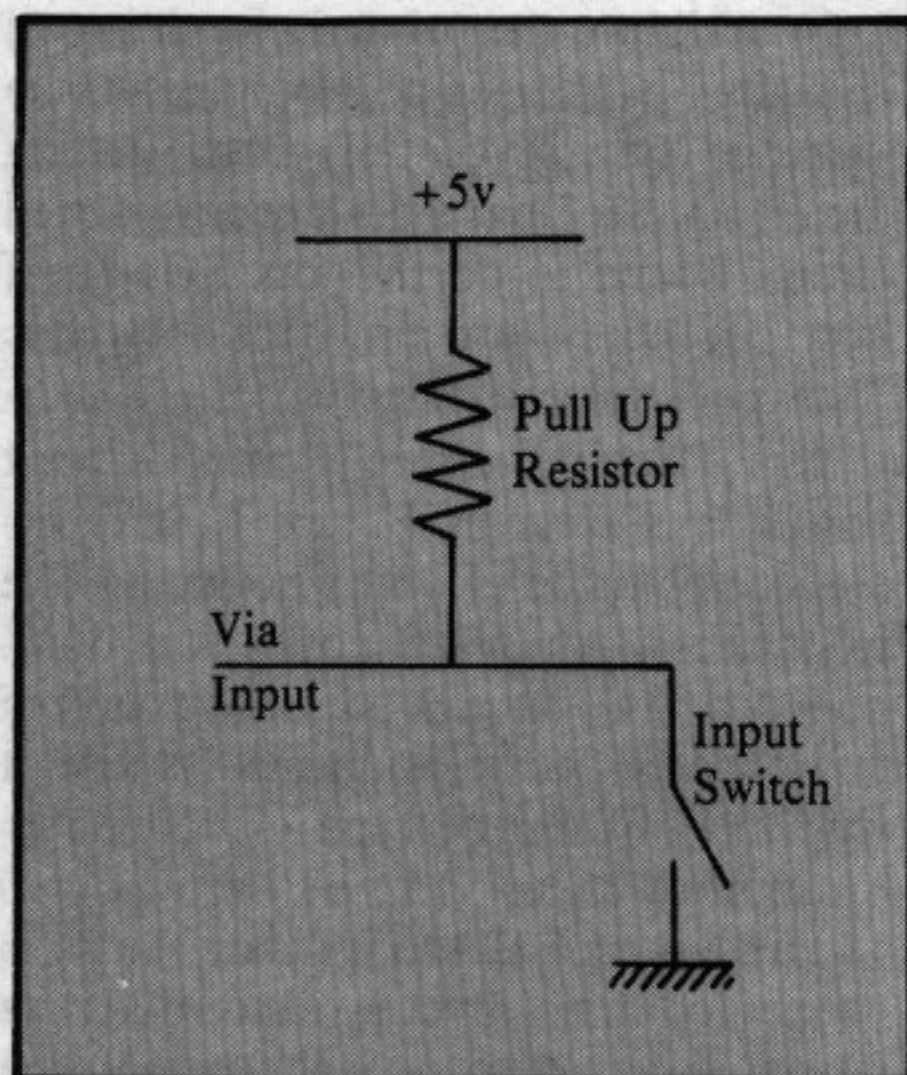


Figure II. A switched input

needed, the resistor value can be quite high and its exact value is not critical. When the line is used as an output the pull-up is added to the load the output has to drive.

If we make the resistor large this produces only a small extra loading and so does not affect the signal when the line is used as an output. That's why I have included them on the printed circuit board.

The construction of Pack No. 1 should present you with no difficulty, especially if you have followed my advice on soldering given in the April issue of Micro User.

The first components to solder on are the resistors. Ten of them are used for pull-up and one for limiting the current through the LED. You should have no trouble identifying them if you just remember that R1 is the odd one out. Mount them on the board at the places marked by lines.

Next solder in the LED. This has to be the right way round to work. The +ve end is the longest of the two wires and should be connected to the nearest R1. The hole is marked + anyway.

Then solder on the screw connector block.

The only thing you can get wrong with that is to put it on the wrong way round so that the holes face into the board. The first one to send me a board like that will receive a "Twit of the Year" certificate. (*Remember only the first one!*)

Finally, the IDC header should be soldered in place. There is a slot out of one side, but it does not matter which way round this goes as the sockets we shall be using are not polarised in this way.

To construct Pack No. 2 you will need a vice. Carefully align the cable on the grooves of the socket and squeeze the two parts together. Then loop the cable back over the top of the socket and clip the strain-relief clip over it.

You now have a connector on one end and, if you are really pessimistic, you can test that there is no shorting between adjacent conductors with a resistance meter.

However, you will only get them shorting if you have not aligned them properly in the first place. Officially there is no going back once you have made the connection, although I have on occasions successfully removed a socket and replaced it.

But be warned, there are no guarantees that you will be able to do this as, if you are not careful, the socket connectors will pull out with the cable. They can be pushed back if they have not been lost or suffered damage.

Now with a connector on one end you are all set to connect up the other end, but pause for a second and consider the socket. There are two ways you can put it on.

If placed on one way, the header it is plugged into will have exactly the same signal positions as the header it came from. When placed on the other way, the two rows of connections in the header will be reversed from one end of the cable to the other.

It is this second way that we want to

connect up our cable. This is because the printed circuit board has been made so that the cable lies away from the board.

Due to the way Acorn designed their board it makes it easier for me to design my board – and cheaper for you to buy – if this reversal takes place in the connecting cable.

The way the cable should look when it is completed is shown in Figure III. Both sockets must be facing the same way – remember to take into account the fact that the cable is looped back over the socket when you are deciding which way round to align it. If you get it wrong the board will not work.

If you are using a ready-made cable be sure to check that it is this way round. Some people may consider that connecting up a cable this way is wrong, but I emphasise it is a deliberate decision and anyway I am in good company as the TRS-80 and even the Acorn Atom need some cables like this.

Once assembled, testing can begin. First switch on the computer and attach the cable to the computer only. If the computer then ceases to work you have a short in the cable, otherwise proceed to the next stage and connect up the printed circuit board.

Remember that the cable should lie away from the board, not over the components. The LED should then light. If not, then it could be soldered in the wrong way round or you could have some other problem.

If the computer crashes (stops working) then you might have the cable connected the wrong way round (see Figure III) or there could be a solder splash shorting out the pins on the IDC header. Check this very closely.

Do not worry about the computer crashing – there is very little danger of doing any permanent damage if you switch it off as soon as you notice it.

Assuming that the LED is on and the computer is still working, connect a wire to the 0v screw connector and run the program in Listing I. This will test out all the data inputs and should show

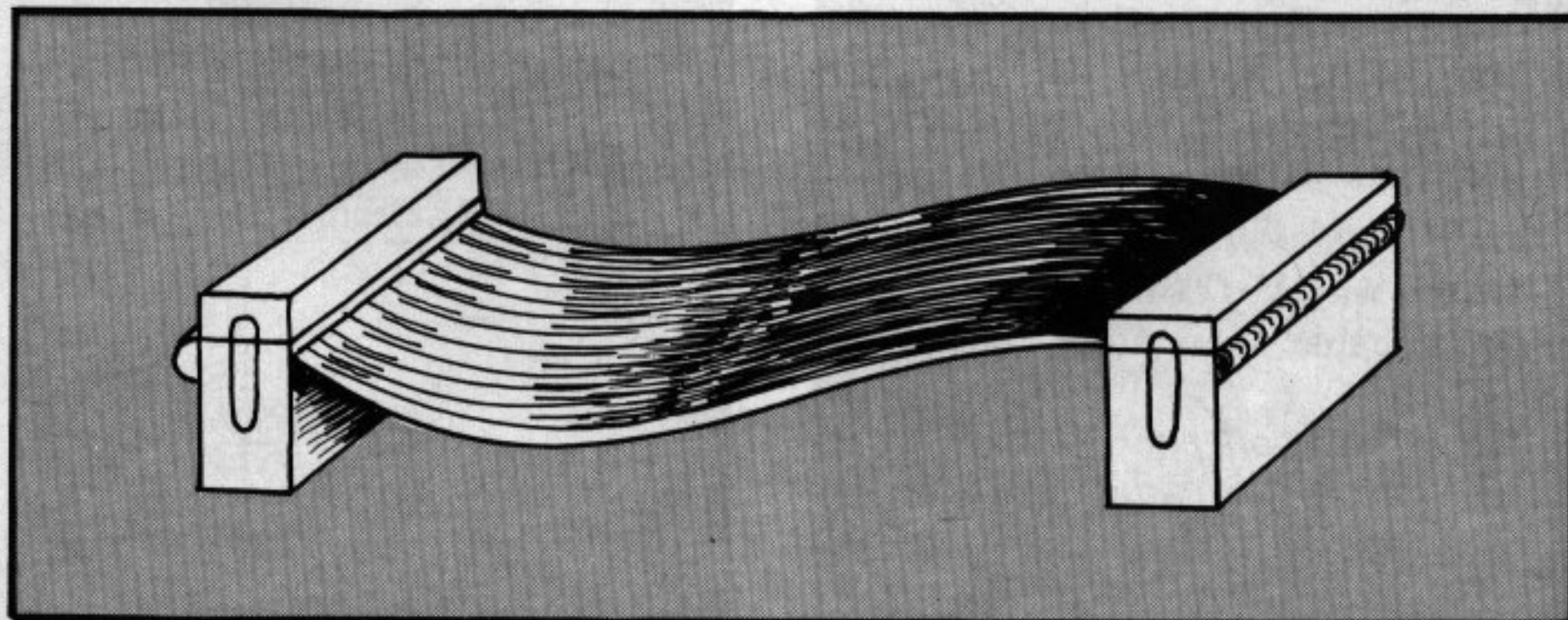


Figure III. Cable configuration


```

10 MODE 7
20 PRINT TAB(5,3), "BODY BUILD No.1
CIRCUIT TEST"
30 PRINT TAB(12,7), "INPUT &FE60"
40 PRINT TAB(10,9), "7 6 5 4 3 2 1 0"
50 ?&FE62=0
60 P%=?&FE60
70 PRINT TAB(10,11);
80 A%=128
90 REPEAT
100 IF (A% AND P%) THEN PRINT "1 ";
ELSE PRINT "0 ";
110 A%=A% DIV 2
120 UNTIL A%=0
130 GOTO 60

```

Listing I

that all the bits are at logic one.

Move the other end of the 0v wire and touch each of the data inputs 0 to 7 in turn. As you do, you should see each bit on the display immediately go to zero and then back to one when the wire is removed.

If more than one bit changes then again check for solder splashes on the board.

For those of you who have not used a computer input port before, the following explanation might help you to understand how one is driven.

Line 50 sets up all the data lines to be inputs. The computer powers up in this state but it does no harm to include the line.

Line 60 inputs the value on the data lines at that time into a variable P% so that the bits making up P% will be identical to the logic state of the inputs.

We then proceed to display this bit pattern. To do this we take a variable A% and use it as a mask to test P% with.

The mask is first set to 128 (a one in bit 7 and zero in all the other bits) and then AND it with P%. If bit 7 of P% is a one then the result will be none zero and hence true so a "1" will be printed on the display. Otherwise a "0" will be printed.

For a more detailed explanation of the AND operation see the User Guide.

Having tested bit 7, we want to test bit 6, and so we must put a one in bit 6 of the mask. As the mask already contains a one in bit seven we can shift it down using line 110.

In this way we test each bit until the mask reaches zero, indicating that we have tested all the bits. The program then loops round to get a new bit pattern from the user port.

Now that we have a working input port there are a great many devices and switches that can be wired up to it.

However, as the saying "All work and no play" is there to testify, I think it is time we took a little light relief as it has been rather heavy going so far.

While not giving away my age (I just have a good memory), I wonder how many of you will remember "Sunday Night at the London Palladium" and in particular the game they had in the section "Beat the Clock"? No, not the one that I still use when someone asks me to do something unpleasant, namely "Arrange these words in a well known phrase or saying - knotted get".

It was a game where contestants had to manoeuvre a loop along a twisted wire without touching the sides. Using the user port we can make a very good simulation of this game. I call it Steady Hands (but then I never did have much imagination!).

All you need is an old wire coat hanger and a block of wood. As old coat hangers tend to be a little tarnished it is advisable to clean them with a little emery paper or steel wool so that they make good electrical contact.

Snip off some of the hanger to form a loop about threequarters of an inch in diameter with a small handle. Also cut two end stops about two inches long from the length of hanger.

Bend the coat hanger into whatever shape you like and clip it into two holes at each end of the block of wood (see Figure IV).

Take the two end stops and mount them at each end of the wire. Either paint the ends of the wire or wrap them with insulation tape so that when the loop is at the ends it connects only with the end stops and not with the main wire.

The program in Listing II will then drive the game, but you will find it is not quite as easy to do as it sounds. I have designed it so that it bleeps when the loop touches the side and some penalty points are added onto your time.

Also a record is kept of the best time and who made it so it would be suitable for running at fund-raising functions and suchlike.

Line 40 sets up P% as the address of the input port, as using a variable rather than a constant is slightly faster. Also line 70 turns off the analogue-to-digital converter to speed things up.

Lines 290 to 320 time your run and also determine the number of penalty points you clock up. In this version each point costs two seconds, but it can

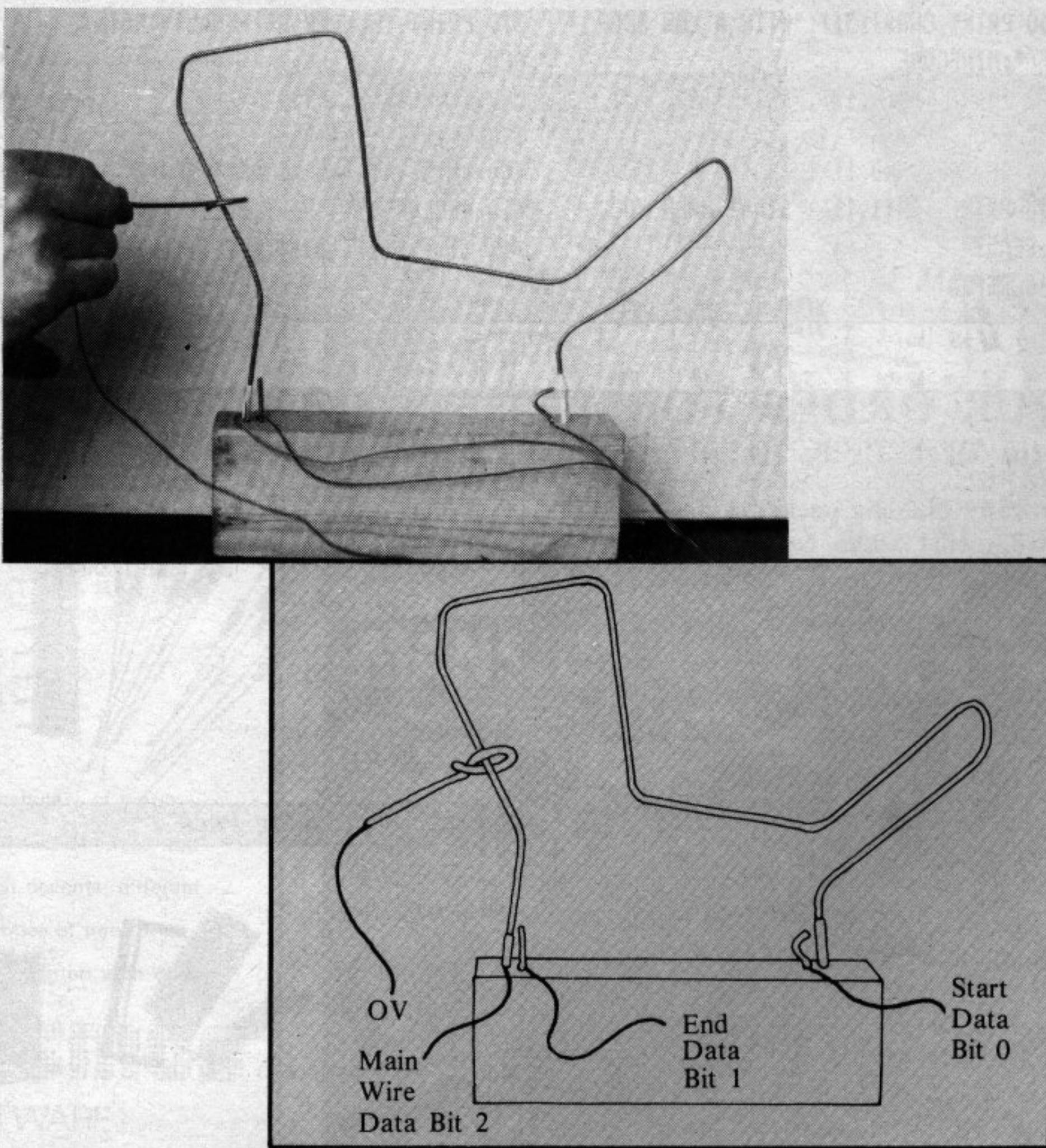


Figure IV. Steady Hands constructional details

From Page 85

be changed by altering line 380.

You might like to change the game so that if you touch the side you have to go back to the start again!

I know of some teachers who are adapting the game for handicapped children by introducing a warning sound and a delay before any penalty points are incurred. This extra feedback helps them to improve their hand-eye co-ordination.

One interesting aspect of running this game is that there is no need to make any keyboard input, apart from entering the name of the best scorer if one is made.

This gives the game a totally different feel from normal computer games and people have told me that they "get on with it much better" as a result.

In addition, if you are running the game at a function the computer can be

hidden out of sight, where no spotty little Herbert can get at the Break key.

Well that's just one application of the user port. There are many more to come in future issues of Micro User, so the connector board would be a good investment whether you are interested in this game or not.

● Next month we will see how the user port can be used as an output as we exercise our muscles to control the world — or at least eight bits of it.

```

10 REM THE MICRO USERS - MIKE COOK
20 REM JULY 1983 ISSUE
30 MODE 7
40 PZ=&FE60
50 ?&FE62=0
60 S=0
70 *FX16,0
80 NCHAMP$=""
90 MINSORE=99999999
100 CLS
110 PRINT TAB(12,3),"STEADY HANDS"
120 PRINT CHR$(134);"SEE BEEB BODY B
ULding COURSE No.5"
130 IF S=0 THEN S=1:PRINT TAB(0,11):
60TO 440
140 IF NCHAMP$="" THEN 180
150 PRINT:PRINT CHR$(131);"TODAYS CH
AMPION IS ";CHR$(136);NCHAMP$
160 PRINT CHR$(131);"WITH A LOW SCOR
E OF ";MINSORE
170 PRINT TAB(0,11),STRING$(60," ")
180 PROCDELAY
190 IF (?PZ AND 1) THEN 460
200 PRINT TAB(1,11),"START WHEN YOU
ARE READY"
210 REPEAT

220 LZ=?PZ AND 1
230 UNTIL LZ
240 PRINT TAB(0,11),STRING$(60," ")
250 TIME=0
260 PRINT TAB(0,11),CHR$(130);"YOUR
OFF"
270 SOUND 1,-15,45,1
280 PEN=0
290 REPEAT
300 LZ=?PZ AND 6
310 IF LZ=2 THEN SOUND 1,-15,100,1 :
PEN=PEN+1
320 UNTIL LZ=4
330 T=TIME
340 PRINT TAB(0,11),"THATS IT YOUR S
CORE IS :-"
350 PRINT
360 PRINT "TIME ";T/100;" SECONDS"
370 PRINT "NUMBER OF PENALTY POINTS
";PEN
380 SCORE=T+PEN*200
390 PRINT
400 PRINT "TOTAL SCORE ";SCORE
410 PROCDELAY
420 IF SCORE < MINSORE THEN PROCCHA
MP

430 PRINT
440 PRINT"MOVE LOOP BACK TO START AG
AIN"
450 PRINT"AND THEN RELEASE IT"
460 REPEAT
470 LZ=?PZ AND 1
480 UNTIL LZ=0
490 GOTO 100
500 DEF PROCDELAY
510 TIME=0
520 REPEAT
530 UNTIL TIME > 70
540 ENDPROC
550 DEF PROCCHAMP
560 PRINT
570 PRINT CHR$(129);"CONGRATULATIONS
"
580 PRINT"THAT IS THE BEST SCORE TO
DAY"
590 PRINT"PLEASE LET ME KNOW WHO YOU
ARE"
600 INPUT"TYPE IN YOUR NAME ",NCHAM
P$
610 MINSORE=SCORE
620 ENDPROC

```

Listing II

YOUR ORDER FORM

for the Beeb Body Building packs

Beeb Body Building packs, as described on Page 83, cost £9.95 each, or £18.95 for both packs. The price includes VAT.

Please send me:

No.

- ☐ Beeb Body Building Pack 1 £.....
☐ Beeb Body Building Pack 2 £.....
☐ Combined Packs 1 and 2 £.....

Plus post and packing £ 1.00

Total

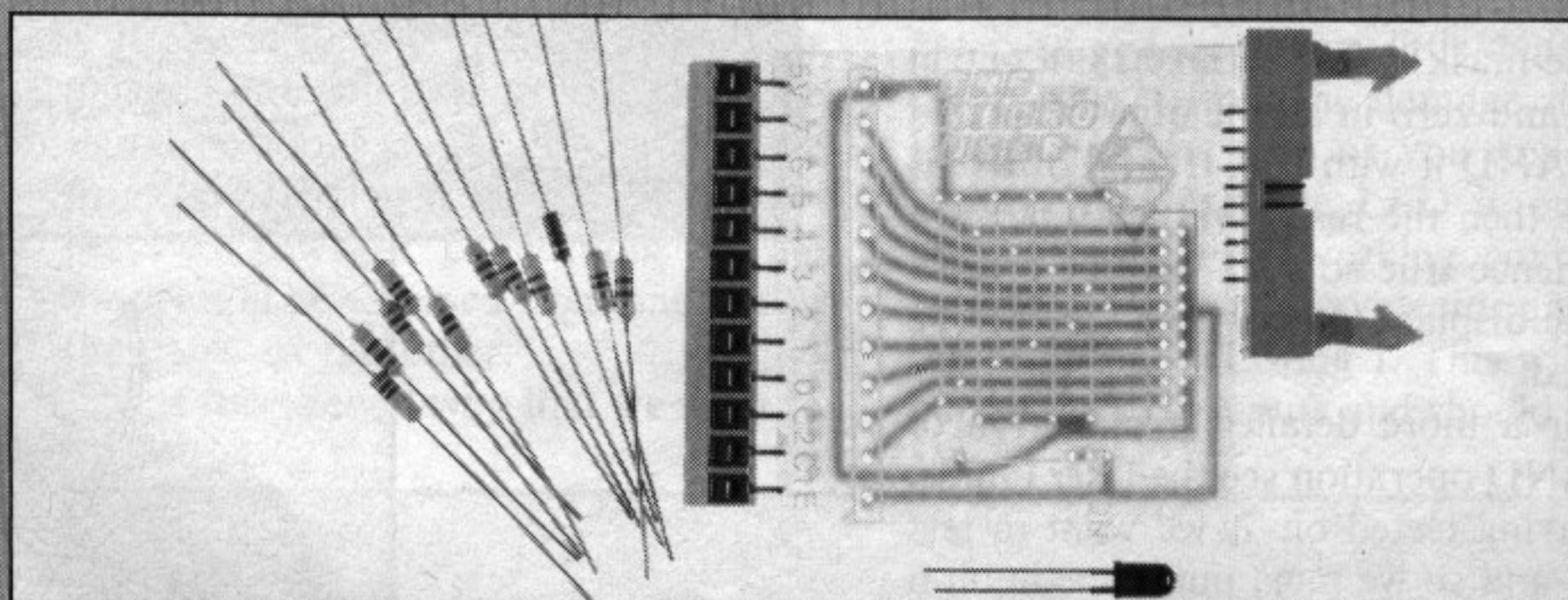
Name

Address

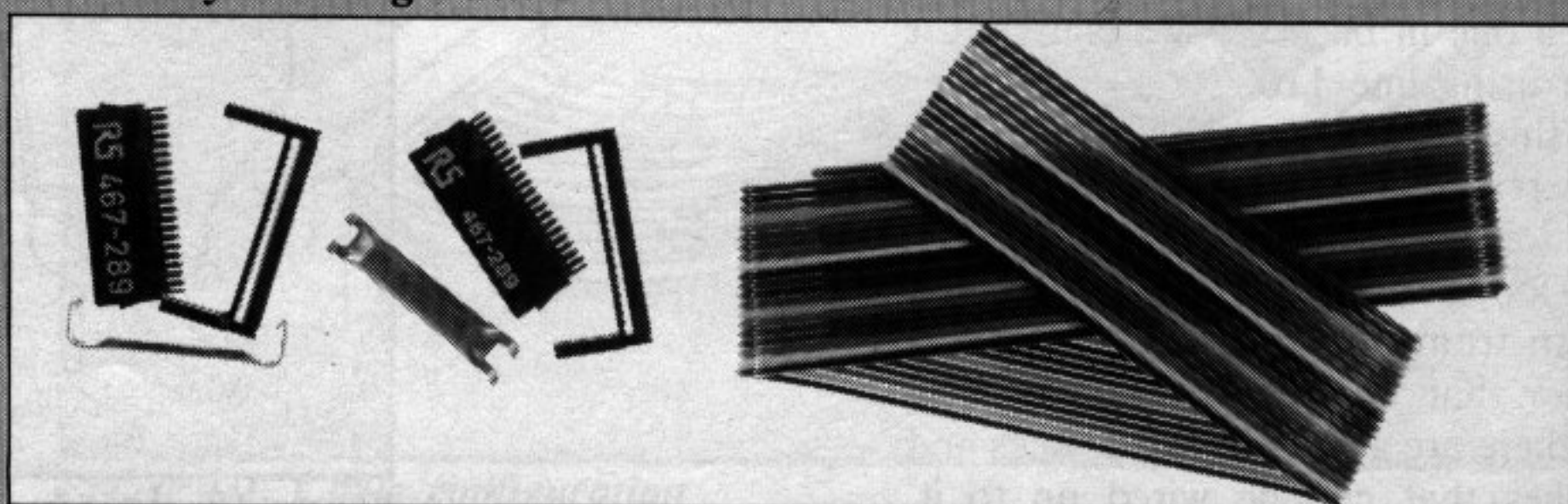
.....

POST TO: BBC Packs, Micro User,
Europa House, 68 Chester Road, Hazel
Grove, Stockport SK7 5NY.

Please allow 28 days for delivery



Beeb Body Building Pack 1



Beeb Body Building Pack 2

BBC MICRO PROGRAMMERS DON'T BE CHEATED

Many of you are selling your programs for cash. A few of you are receiving up to £500 for a program. But think! Are you getting a good deal?

We pay 25% royalty on each program sold. If your program sells in the hundreds of copies you will be much better off. If it sells in the thousands you will be rich.

You need the money — we need the programs.

We are looking for all classes of program. Games, Educational, Business, Adventure and Utilities.

Every program received will be evaluated and a score sheet prepared rating your program for such things as presentation, useability, fun value, use of graphics, use of sound etc.

You may have a good idea but not be able to perfect the programming. We still want to hear from you. Our programming team may be able to make a world beater out of your idea. We will still pay you a (reduced) royalty.

We still need more experienced 6502 machine code programmers. If you think you are good send a sample of your work. If we agree we could have some commission work for you.

It is most important that you mark your name and address clearly on your cassette along with your telephone number. State whether the program is for Model A or Model B BBC computer and also whether you have a 0.1 or series 1 operating system. Programs should be original and not copied from magazines or other sources. If your program is up to our high standard or is worth further development you will be offered a software contract.

Hurry! Send your program to

CompuSoft Ltd

32/34 Watchyard Lane, Formby, Liverpool, L37 3JU.

BBC COMPUTERS

from

FAIRHURST DEAN ROW LABORATORIES

We have 100 BBC 'B's for immediate sale.

100 Disc Controller Chips and Disc Drives and Upgrades.

Ask to see networking the Econet and Torch Computer.

New Micro Professor MPF II **£269.00**

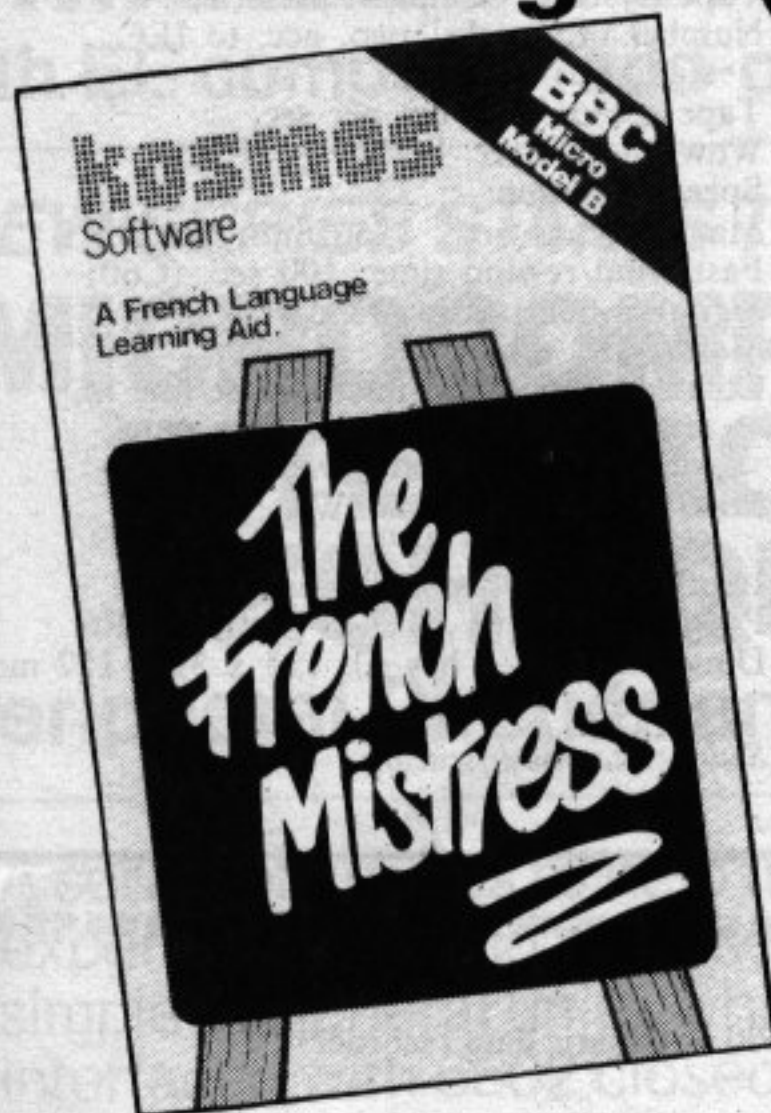
Ask about our BBC talking to the Apple Computer.

**Phone Wilmslow (0625)
533741**

**(Hurry because we might have to take
the telephone off the hook!)**

Introducing . .

NEW



- ★ Pupils
- ★ Teachers
- ★ Travellers
- ★ Students
- ★ Graduates
- ★ Linguists
- ★ In fact anyone having an interest in French will benefit from this unique language learning aid

- ★ Ready made lessons provide an enormous vocabulary of words, phrases and verbs arranged in subject groups.
- ★ Lessons can be run in three ways; learning, self-test or speed and accuracy test.
- ★ Clear, large-format displays including all French accents; different colours for masculine and feminine words.
- ★ Full tape editing facilities allow an infinite number of new or updated lessons to be created and stored for later use.
- ★ Runs on all operating systems including systems fitted with disc.

Choice of Level A or B cassettes with totally different vocabularies. **£8.95** each (P&P inc.)

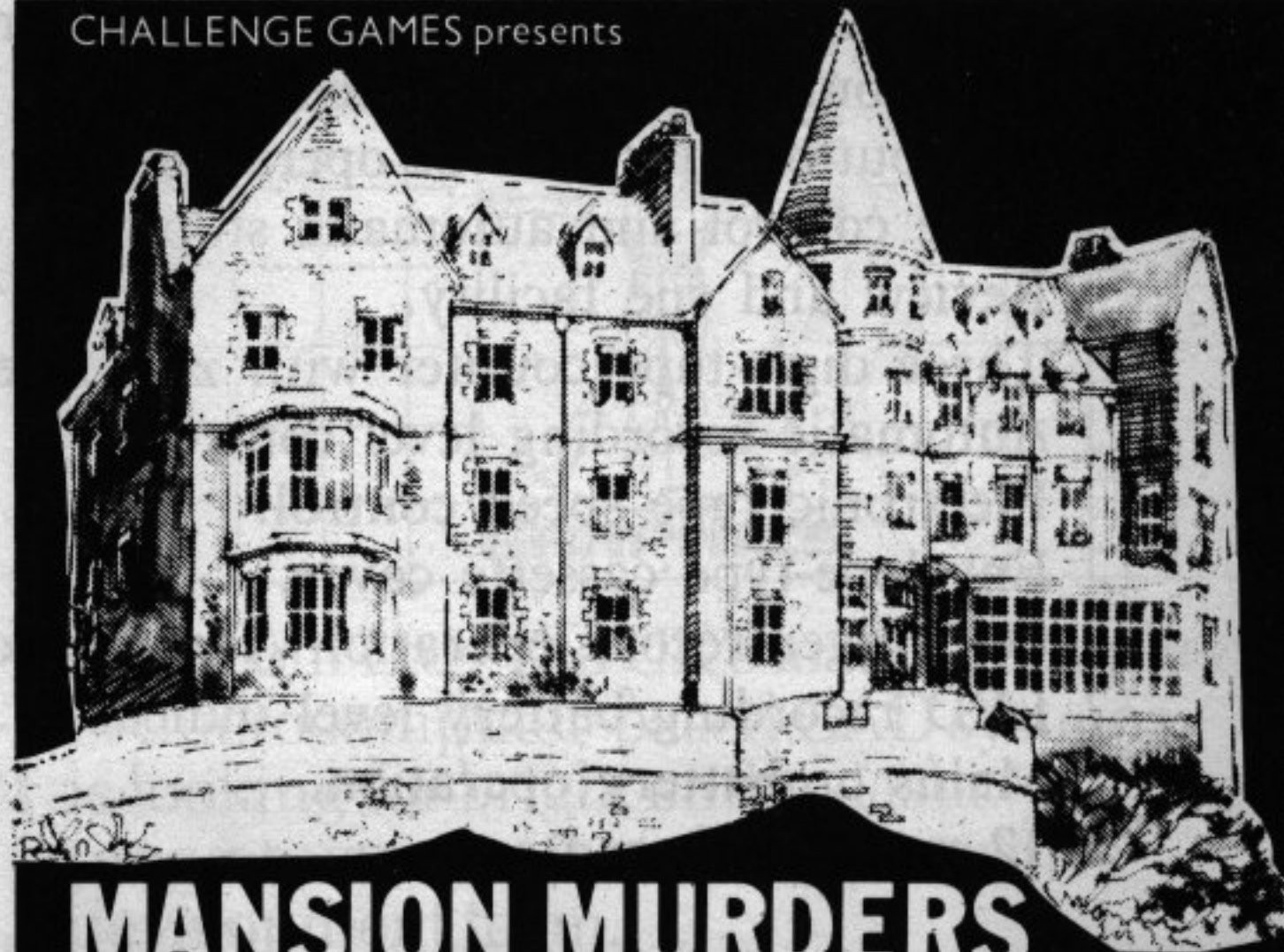
Both cassettes include extensive word lists; verbs and phrases are introduced in Level B. Available from dealers or mail order.

COMING SOON! "The German Master", "The Spanish Tutor"

**KOSMOS
SOFTWARE**

1 Pilgrims Close, Harlington,
Beds. LU5 6LX.
Tel: 05255 3942

CHALLENGE GAMES presents



MANSION MURDERS

Mansion Murders slowly reveals a web of suspects, weapons and motives, with time and place variations.

You can take risks—though you may get murdered yourself!

Every time you play you get a different situation, with thousands of variations—a strategy game which tests your deduction and logic.

Comes complete with rules and notes on tactics. Uses colour and 28k of program space.

£6.95 (postage etc. included) from

CHALLENGE GAMES
64 Ferndale Road, London E11

GUARANTEED!

Your cassette loading and saving problems eliminated

First of an entirely
new concept of data
cassette recorder —
specially designed
for use with the
BBC Micro.



£49.95

incl. VAT & p&p

*Just arrived — the first shipment of
the remarkable PYE D6600 with the
following impressive features:*

- ☐ Remote socket for direct microcomputer control.
- ☐ Backed by the international Pye Organisation.
- ☐ High quality electronics and finish.
- ☐ Compact size (only 115 x 32 x 187mm).
- ☐ Input/output levels designed to match BBC Micro.
- ☐ Pushbuttons for ease of operation.
- ☐ Tone control and automatic stop.
- ☐ Review and cue facility.
- ☐ Three digit tape counter with zero-reset button.
- ☐ Automatic recording level control.
- ☐ Electronic tape speed control.
- ☐ Envelope-type cassette cover.
- ☐ One-finger record operation (for non-computer use).
- ☐ LED recording/battery level indicator.
- ☐ Mains or battery operation.
- ☐ 12 months guarantee.

Initial supplies are severely limited, and
orders will be met strictly on a first come,
first served basis.

**We guarantee that no
money will be banked
until the goods are
ready for despatch.**

SPECIAL OFFER
All data recorders ordered
will be supplied with a mains
power supply and a lead suitable
for connection to the BBC
Micro — **BOTH FREE!**

TECHNICAL DATA

Tape System: Compact Cassette
Number of Tracks: two, acc. to IEC
standards
Tape speed: 4.76 cm per sec.
Wow and flutter: 0.3%
Speed variation: $\pm 2\%$
Max. playing time: 2x60 min. (C120)
Fast wind/rewind time: 100 sec. (C60)
Signal-to-noise ratio: 45 dB
Motor: DC motor
Connection sockets: microphone/line in,
remote control earphone/line out.
6v DC external supply in
Max. output power: 0.4W
(± 1 dB; D = 10%)
Loudspeaker: 55 mm diam. 80 ohms.
Power supply: 6V, 4x1.5V batteries R6
Dimensions (w x h x d): 115 x 32 x 187 mm
approx.
Subject to modification.

ORDER FORM

Please supply Pye D6600 automatic data recorders
at £49.95 each.

- * I enclose a cheque for
- * Debit my Access a/c with £

Access No. Expiry Date

Signed

Name

Address

..... Postcode

Send to: Veltomax Limited, Norbury House, Norbury Crescent,
Hazel Grove, Stockport, Cheshire.

Please allow 28 days for delivery.

* Delete if not applicable.

**THE BBC MICRO SOUND SYSTEM
MICROVOC**
As supplied to Schools & Colleges

SYSTEM INCLUDES:

Speakers, Volume control, jack sockets and all connections (assembled).

Easily fitted with no drilling, soldering or cabinet modifications **£23.00** inc VAT and p & p

MUSIC SOFTWARE now available.

MICRO-ADVENT

Ashlyn House, 113 Writtle Road, Chelmsford, Essex.
Tel: 0245 59708

'MUSICSOFT'

Fun & Educational Software for BBC 32K

'PIEMAN' ... Not as Simple as Simon!

Starting with a Simon look-alike, this suite of musical games is great fun for 5 year olds, yet proves frustrating and addictive to music graduates in the later stages. Scores and skill levels are additive and alterable. 'PIEMAN' cassette and instructions £3.75 inc. P&P

'MUSICTOOLS 1' ... Over 60 procedures to use in your own musical programs, already incorporated in the following 5 working programs to illustrate their use: ● **ORGAN**. Play, store, replay faster, slower, exactly as played(!) or smoothed out, 6 or 7 octaves with notes not mentioned in the guide. ● **TUNE GENERATOR**. Creates a chord sequence, tune, quaver variations, displays a dynamic keyboard and notes on a stave as tune is played (it LOOKS like music). ● **CLEFTOOL**. Draws musical symbols in 26 different sizes on a stave, this one is great for teachers. ● **1, 2, 3 PART TUNE PLAYER**. Simple input from data, with demo tune. ● **ENVELOPE EXPLORER**. Display and alter all parameters with cursors. Experiment with the sound power of the B.B.C. Micro. 'MUSICTOOLS 1' cassette and instructions £5.75 inc. P&P.

Sounds great with Microvoc - see full page ad this issue.

Cheques & Official orders to:

'MUSICSOFT' 12 Fallowfield, Ampthill, Beds. **0525 402701**

EPSON'S LATEST PRINTERS

SAVE UP TO £80 (+ VAT) when you order your superb new RX80, FX80-MX100 printer from Datatech, the Epson specialists.

We also have large stocks of Epson sundries including cartridge ribbons, dust covers, fanfold paper, continuous labels, etc.

For **FREE BROCHURE** and special **DISCOUNT OFFER** write now to:

DATATECH LTD (BMU)

3 Bramhall Close, Timperley, Altrincham, Cheshire
WA15 7EB.

SQUIRREL SOFTWARE

TOP QUALITY GAMES FOR BBC MICRO

SUPERGOLF 'B' - Mode 2 - Multicolour **£7.50**
The ball speeds into the air, slows, curves down and rolls. Bunkers, water, wind and O.O.B. to cope with. Up to 4 players. 18 different holes!

BUNFUN 'B' - Mode 2 - Multicolour **£6.50**
Icing and nuts have to be squirted on as the buns go past! You will need good RHYTHM, TIMING, REACTIONS. Multi levels.

SPACE WALKER 'B' Mode 1 - 4 colours **£6.50**
TOOLKIT - 'A' or 'B' **£6.50**

Graphics Design Pad - Disassembler - Variables List.

All cassettes compatible with O.S, 0.1 and 1.2

Trade enquiries welcome.

Cheques, PO's to Squirrel Software, 4 Bindloss Av, Eccles,
Manchester M30 0DU.

24 Hour Answering Service 061-789 4120

...MORE TO EXPLORE
with EE computer "add-on" projects...

NEW SERIES STARTS THIS MONTH
MICROCOMPUTER
INTERFACING
TECHNIQUES

Peripheral Circuits and Software

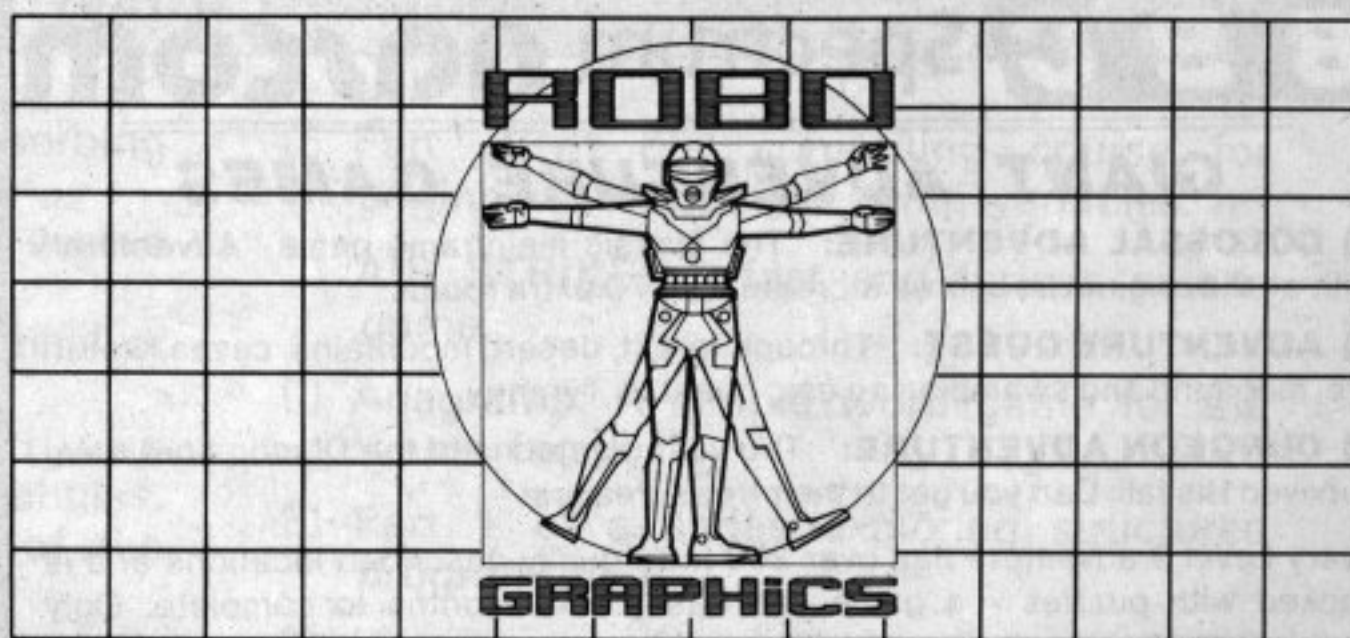
A series of articles to help the electronics experimenter build and use a range of simple peripheral units, which can be interfaced with 6502 closed microcomputers.

EE knows how to make
circuit building easy

*JULY ISSUE
on sale June 17-85p

EVERYDAY
ELECTRONICS
and computer PROJECTS

*Available from your local newsagent. In case of difficulty send £1 to:
Post Sales Dept., IPC Magazines Ltd., Lavington Street, London, SE1 0PF.



Robocom Ltd—the UK's leading supplier of microcomputer-based CAD systems is looking for bright enthusiastic programmers to join their innovative development team.

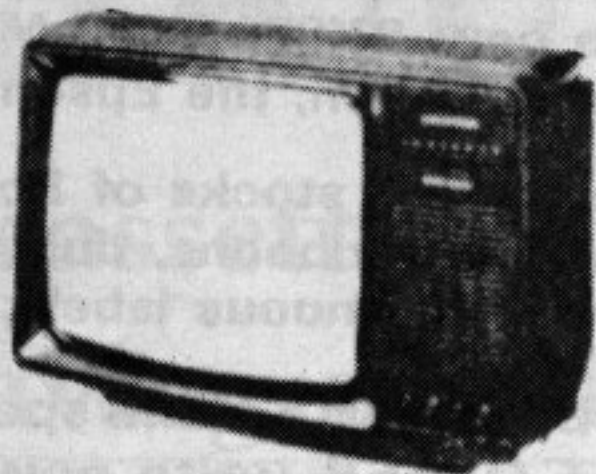
6502 assembler experience an advantage. Applicants will be given the opportunity to develop experience with UNIX and 'C'

Top level remuneration negotiable according to age and experience.

Please contact Martin Ellis
on 01-263 6682

Robocom Ltd. CIL Building, Goodwin Street
London N4 3HQ 01-263 8585

GRUNDIG KINGSLEY



R.G.B. MONITOR/TV (GRUNDIG APPROVED)

As supplied to Education Authorities Specification

R.G.B. inputs (Analogue and Digital Levels) all models
1 Volt P.P. composite video (remote model only)
Teletext decoder available to plug into chassis. (remote
model only). Remote control of computer via monitor
(remote model only). Sound input gives access to audio
amp all models. Instantly switches back to TV.

12" MONOCHROME MONITOR/TV	£95 + VAT
14" COLOUR MONITOR/TV	£227 + VAT
16" COLOUR MONITOR/TV	£255 + VAT
16" COLOUR MONITOR/TV REMOTE	£295 + VAT
20" COLOUR MONITOR/TV REMOTE	£315 + VAT
22" COLOUR MONITOR/TV REMOTE	£340 + VAT
26" COLOUR MONITOR/TV REMOTE	£380 + VAT
PLUG IN TELETEXT MODULE	£75 + VAT
CONNECTING LEAD	£5 + VAT
CARRIAGE AND INSURANCE	£9.50
4 YEAR GUARANTEE	£29.60

KINGSLEY

40-42, Shields Road, Newcastle-upon-Tyne,
NE6 1DR. Tel: (0632) 650653

BBC Micro-Aid

SOFTWARE - Programs that are guaranteed to run! Save hours of work and worry with these utilities and practical programs on cassette or disc.

102	CASHBOOK	Double entry 4 columns with accounts	£ 5.95	B
103	LEDGER	Complements CASHBOOK with ageing & analysis	£ 5.95	B
104	MAILING	Holds 218 addresses. System with 6 options, 2 Sorts, Labels, 2 Searches & Update	£ 5.95	B
105	PAYROLL (W or M)	In two parts to handle weekly or monthly PAYE & NI for 100 employees. Supported.	£13.90	B
105a	Manual	Extra (No VAT)	£ 2.50	B
106	MEMO-CALC	Database/Calcsheet with up to 255 columns, string or numeric data, sorts, searches, calculations, with full print facility.	£ 9.95	B
106a	Manual	Extra (No VAT)	£ 2.00	
201	CARDS	Beat Bruce Forsyth at his own game.	£ 2.95	A/B
202	BATTLE	Fast moving game simulation of a minefield.	£ 2.95	B
203	HANGMAN	Word game. French, German, Italian, Spanish.	£ 7.95	B
301	BANNER	Paper printout of large text & graphics.	£ 2.95	A/B
302	DISTANCES	Graphic maps of U.K., EUROPE & WORLD. Calculate distance between any two places.	£ 3.95	B
303	FLAGS	Full colour flags of the world & questions.	£ 3.95	B
304	STATPAK	Statistics offering over 30 results.	£ 8.95	B
501	SEARCHBAS	PROC to search a BASIC program & alter it.	£ 1.95	A/B
502	PROCVAR	PROC to list variables used in a program.	£ 1.95	A/B
503	PROCFUSH	PROC to clear Resident Integer Variables.	£ 1.00	A/B
504	PROCAID	A combination of programs 501, 502 & 503.	£ 3.45	A/B
505	DEFCHR	Design, display & store graphic characters.	£ 2.95	A/B
506	SORTM/C	Machine code sort for up to 255 integers.	£ 1.00	A/B
507	SORTBAS	A very fast BASIC sort. 1000 items in 42s.	£ 1.00	A/B
508	UTILITY-A	Combination of 501 to 507. Superb value.	£ 5.95	A/B
600	FORTH	Second language ROM for either OS.	£34.74	B
601	WORDWISE	ROM Superb fast & easy wordprocessor OS 1.0 or OS 1.2	£34.74	B
701	BOOKS	Various titles for the BBC Micro from (No VAT)	£ 6.95	
801	CASSETTES	C12 Computer quality boxed in 10's.	£ 4.50	
810	DISCS	MEMOREX Soft Sector 40 track 5.25"	£19.95	
900	PRINTERS	RX-80 100cps, 3 FOUNTS, Graphics.		
901	NEW EPSON	FX-80 F/T, 160CPS, 3 FOUNTS, Graphics.	£379.00	
905	SEIKOSHA	GP-100a Printer 50cps, 80 columns, tractor	£195.00	
910	NEW TEAC	Slimline Disc drives suitable for BBC Micro with Power supply. Format disc & Manual.		
	100K	Single Sided, 40 Track. OTHERS AVAILABLE.	£199.00	
920	VDU STAND	Stainless steel support protects your micro	£19.95	

ADD VAT TO ALL PRICES. FOR COPY ON DISC ADD £1.50.
NO PACKING CHARGE.

If you want further information before parting with your hard
earned cash send for our new brochure to:-

Micro-Aid (BU)
25 Fore Street, Praze, Camborne,
Cornwall TR14 0JX.
Tel: 0209-831274



BBC Spectrum nascom

GIANT ADVENTURE GAMES

- 1) COLOSSAL ADVENTURE:** The classic mainframe game "Adventure" with all the original treasures & creatures + 70 extra rooms.
- 2) ADVENTURE QUEST:** Through forest, desert, mountains, caves, water, fire, moorland and swamp on an epic quest vs Tyranny.
- 3) DUNGEON ADVENTURE:** The vast dungeons of the Demon Lord have survived His fall. Can you get to their treasures first?

Every Level 9 adventure has over 200 individually described locations and is packed with puzzles - a game can easily take months to complete. Only sophisticated compression techniques can squeeze so much in! Each game needs 32K and costs £9.90

BBC FORTH, FORTH TOOLKIT

"r q FORTH" runs on 16K or 32K BBC micros and costs £15. It:

- ★ follows the FORTH-79 STANDARD and has fig-FORTH facilities;
- ★ provides 260 FORTH words;
- ★ is infinitely extensible;
- ★ has a full-screen editor;
- ★ allows full use of the M.O.S.;
- ★ permits use of all graphic modes, even 0-2 (just!);
- ★ provides recursion easily;
- ★ runs faster than BBC BASIC;
- ★ needs no added hardware;
- ★ includes a 70 page technical manual and a summary card;
- ★ has hundreds of users.

Level 9 Computing are pleased to announce a new toolkit for "r q FORTH" on 32K BBC micros. It costs only £10 and adds the following facilities to FORTH:

- ★ a 6502 assembler, providing machine-code within FORTH;
- ★ turtle graphics, giving you easy-to-use colour graphics;
- ★ decompiler routines, allowing the versatile examination of your compiled FORTH Programs;
- ★ the full double-number set;
- ★ an example FORTH program; and demonstrations of graphics;
- ★ other useful routines.

nascom

Extension Basic £15/£30 ROM
Adds 30 new keywords to BASIC
Compression Assembler 2 £12
Small Source + high speed

Asteroids m/c,g £7.90
Galaxy Invaders m/c,g £5.90
Missile Defence m/c,g £7.90
Super Gulp eb,g £4.90
5-games cassette misc £5.90
(FULL RANGE IN CATALOGUE)

ALL PRICES INCLUDE P & P AND VAT. All programs are in stock and will be sent within 2 days of receipt. Please send order or SAE for catalogue, describing your micro, to:

LEVEL 9 COMPUTING

Dept U, 229 Hughenden Road, High Wycombe, Bucks. HP13 5PG

BBC
32K



EDUCATIONAL SOFTWARE

LINDEN LEA, ROCK PARK,
BARNSTAPLE, DEVON. EX32 9AQ.
TEL: (0271) 45566

AT LAST!

GOOD EDUCATIONAL SOFTWARE

We think we've got it right. No doubt you'll tell us if we haven't.

SPACEX
£10

An adventure/simulation project designed to engage a whole class in strategic planning, discussion, map work, role play and plenty of creative activity for weeks. As scientists stranded on the planet Persephone your children must work together if they are ever to leave. Manual of ideas and suggestions ensures the project will be an educational experience. Ages 10+

**WORLD
Geography**
£10

An extremely flexible package to promote atlas skills. Features a high-res. world map on which locations must be identified. Package includes 6 sample data files - Mountains, Oceans, Continents, Cities, Countries and Islands - BUT an easy-to-use filing program allows teachers (and children) to create new, or adapt existing, files.

**LINES
and
ANGLES**
£5

A set of 2 programs designed for the younger child (but enjoyed by the older ones). LINES - teaches and tests the concepts of 'horizontal' and 'vertical'. ANGLES - teaches what is and isn't a right angle. Both use sound and graphic effects which your children will love. (Definitely not boring!) The long term effectiveness of these programs has been proved in the classroom. Ages 6+

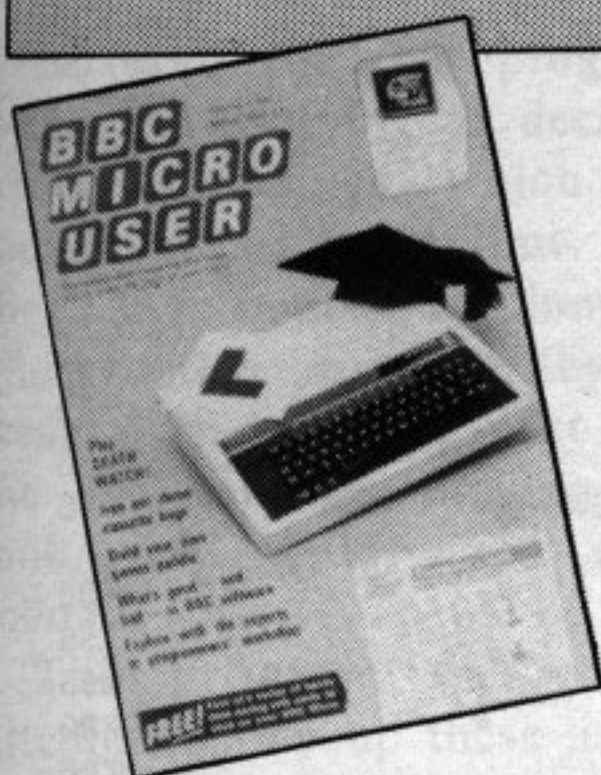
**All
4 MAT
programs**

1. are classroom tested
2. use sound and graphics
3. are ideal for home use

P&P included
for disc
add £2

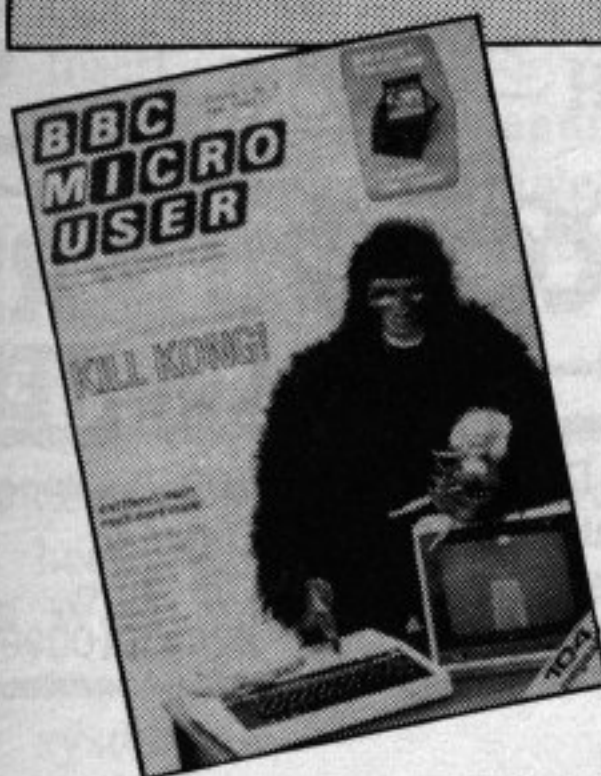
Make sure your collection is complete!

Articles in the March issue included:



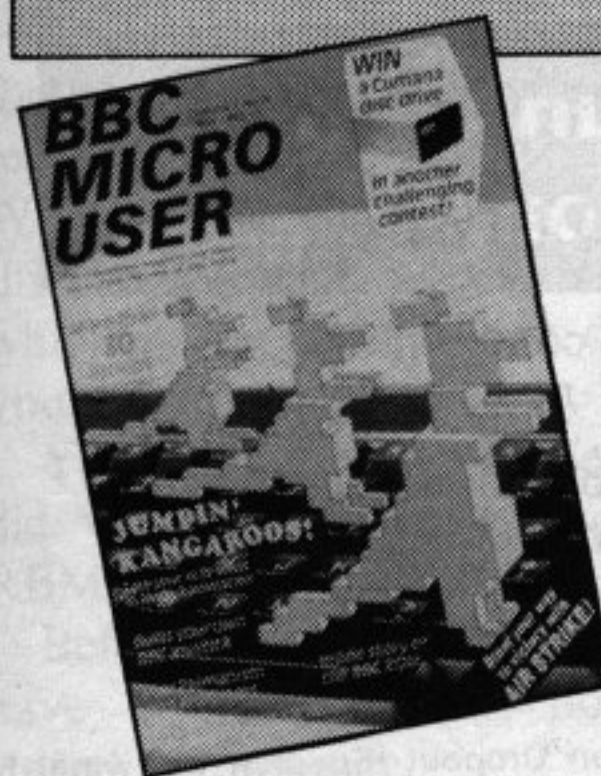
- ☐ Part 1 of our series on computing for beginners introduces the keyboard.
- ☐ How to build your own games paddle.
- ☐ Review of the Alphabeta word processor.
- ☐ Part 1 of our easy-to-understand guide to text colours and graphics.
- ☐ Part 1 of our introduction to the BBC operating system.
- ☐ How to avoid those annoying cassette loading problems.
- ☐ DEATHWATCH! Complete listing of this arcade game.
- ☐ How to upgrade a Model A to B at half the shop price.
- ☐ Create your own micro portrait gallery with our "Shapes" program.
- ☐ Play Bingo and learn about random numbers.
- ☐ Part 1 of our evaluation of colour monitors for the BBC Micro.
- ☐ Speed up your processing time with our sorting routines.
- ☐ Programmers' Workshop shows how to test for function keys in machine code routines.

Articles in the April issue included:



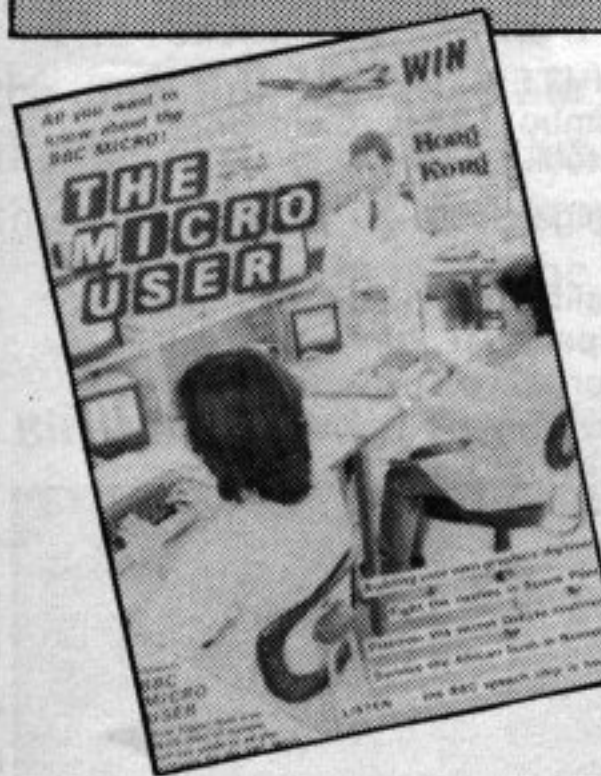
- ☐ How to produce impressive graphics using Teletext Mode 7.
- ☐ Having listing trouble? We review common copying errors.
- ☐ Part 2 of computing for beginners discusses simple programming techniques.
- ☐ Our graphics course teaches how to draw multi-coloured lines.
- ☐ KING KONG! Fly your helicopter and rescue maidens in distress.
- ☐ Part 2 of our guide to the BBC's operating system.
- ☐ Part 2 of our review of BBC colour monitors.
- ☐ 8-PAGE PULLOUT: Essential reference guide for Basic programmers.
- ☐ Final part of how to upgrade a Model A into a Model B.
- ☐ Programmers' Workshop helps you find the ROM's action addresses.
- ☐ Binary code: What is it and how to use it.
- ☐ Disc formatter: The essential program you need to run discs.

Articles in the May issue included:



- ☐ Pelmanism: Full listing for this absorbing memory game.
- ☐ Mode 7 animation gives impressive graphics with low memory costs.
- ☐ Simple techniques to generate vertical or even inverse text.
- ☐ Our graphics course continues colourfully with triangles and rectangles.
- ☐ Build yourself a joystick: Part 3 of the Beeb Body Building Course.
- ☐ Two whole articles devoted to investigating the Osbyte routine.
- ☐ Part 3 of our computing course for beginners introduces string variables.
- ☐ AIR STRIKE! A fast and furious arcade game.
- ☐ Anagrams: A simple word game for the whole family.
- ☐ Part 1 of a series exploring structured programming.
- ☐ How to make full use of the BBC Micro's editing function.

Articles in the June issue included:



- ☐ Part 2 of our series on editing on the BBC Micro looks at LIST and LISTO.
- ☐ We sound out the BBC speechchip.
- ☐ Part 2 of our series on structured programming.
- ☐ Our beginners' series examines the use of the INPUT statement.
- ☐ Cassette Capers - more ideas to solve those perennial cassette problems.
- ☐ 8-PAGE PULLOUT: Part 1 of our Guide to Software for the BBC Micro.
- ☐ Build yourself a graphic digitiser with the latest Beeb Body Building exercise.
- ☐ We uncover the hidden *FX calls, explain indirection operators and give a single key memory display program.
- ☐ Beyond Z - an easy to follow introduction to User Defined Characters.
- ☐ SPACE PILOT! Three games in one in this all action galactic blockbuster!
- ☐ Graphics: We investigate text and graphic windows.
- ☐ Nomsim: an intriguing simulation of life on the African Savannas.
- ☐ We present a colourful guide to bringing your User Defined Characters to life.

Back numbers still available at **£1.25**

incl. p&p

**ORDER FORM
ON PAGE 73**

Silicon Centre Edinburgh

7 ANTIGUA STREET, EDINBURGH EH1 3NH

TEL: 031-557 4546

BUSINESS AND PERSONAL COMPUTERS

BBC



BBC COMPUTERS IN SCOTLAND

BBC Computers, Disc Drives, Printers, Software, Colour Monitors, Modifications, Upgrades A-B, Repairs etc.

WE SPECIALISE IN "TORCH Z80" DISC PACS

Turn your BBC Microcomputer into a full business system running CP/M and BBC Basic. The Torch Disc Pac adds a second Z80 microprocessor, 64K of RAM and 800K of disc storage for ONLY **£780.00** + VAT.

1.20.5.
NOW IN
STOCK

MICRONET 800
COMING SOON

PHONE: 557 4546 or call in for a demonstration.

AUTHORISED ACORN/BBC DEALER & SERVICE CENTRE

* BBC Model B Computer	£ 99.00
BBC Computer Dust Cover	3.99
* BBC/LVL Single 100K Disk Drive	265.00
* BBC/LVL Twin 100K Disk Drive	389.00
Disk Drive Covers	3.99
* Torch 280 Disk Pack	897.00
* 14" Microvitec Colour Monitor	287.50
* 12" Sanyo Green Screen	90.85
* 14" Sanyo Colour Monitor	276.00
* Grundig 14" Colour TV/Monitor	275.00
* Seikosha GP100A Printer	229.94
* Seikosha GP250Z Printer	274.85
* Epsom FX80 Printer	503.70
* Epsom RX80 Printer	332.35
* Epsom MX100 Printer	539.35
* Silver Reed EX44 inc. Interface Typewriter/Printer	516.35
Tape Recorder Leads	
Din to Din + Jack	3.95
Din to 3 Jacks	3.95
Wordwise	39.95
View	59.80
Acorn Soft from..	9.95
BBC Software (all titles)	10.00
Educational Software from..	5.69
Books - hundreds of titles S.A.E. for list	Price including VAT
* Carriage £8 including VAT.	

VICTOR — TORCH — OSBORNE

DAKLEAF COMPUTERS LIMITED



ACORN SPECIALISTS

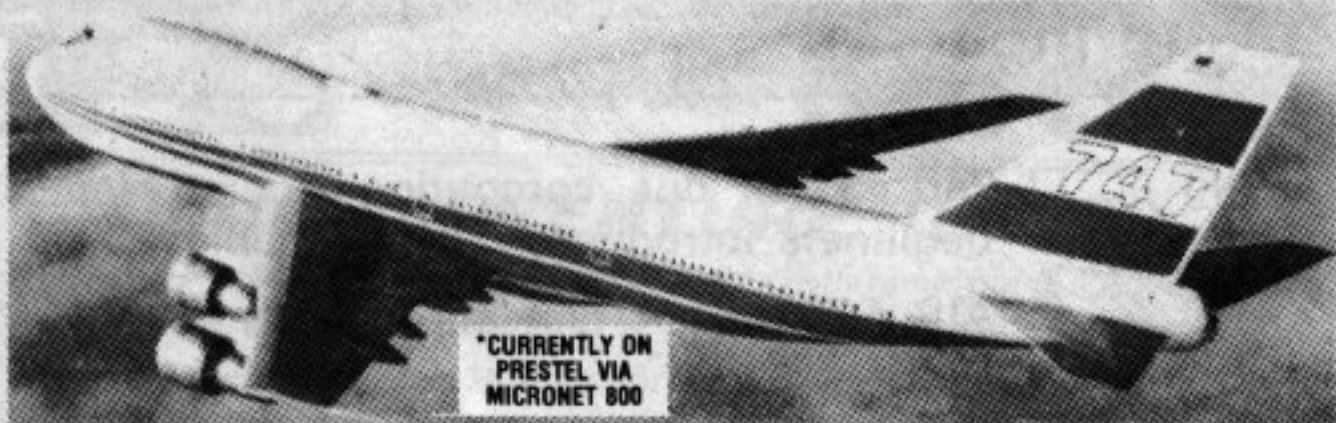


121, Dudley Road,
Grantham,
Lincs.

0476 76994/70281

100, Boughton,
Chester,
Cheshire.

0244 310099



BBC 32K 747 FLIGHT SIMULATOR & BRIEFING

A full blown, pilot written, simulation (writer of the famous Atom 747) real time instrument and visual display, 3D runway view (Heathrow or Gatwick), large dials, moving pointers plus digital readout. Demonstration approach and landing. Full, separate briefing program. Area chart, notes and flight plan.

A new concept, a new classic...

Wolfpack III

BBC MICRO 32K

Combat briefing and program

"Sometimes your first warning is a lancing disruptor beam striking from beyond — sometimes they materialise close at hand. You are either quick or dead!"



True in-space cumulative motion, amazing full colour Starfield graphics & sound. Multiple ship control, each ship has its own mission and destiny. 4 types of enemy, meteor strikes. Good strategy rewarded by energy & promotion. Poor combat rewarded by death! (but rescue/refuel possible). Rotating base station, inter galactic warp.

KREMLIN 3D multi level maze escape with Gremlin Kombatt!

Standard/random/peaceful exploration option!

WORD PERFECT Friendly and versatile full facility 80 column word processor (add £4 for disc version).

DEALERS PHONE (0903) 206076 ROYALTIES DOC PAYS THE BEST FOR THE BEST

Orders to: Doctor Soft, 258 Coneygree Road, Stanground, Peterborough PE2 8LR.

NO extras all prices fully inclusive

..... copies of 747 @ £6.95
..... copies of Wolfpack £7.95
..... copies of Kremlin £6.95
..... copies of Word Perfect £9.95

TOTAL £

Name

Address



DOCTOR SOFT

ADVANCED SOFTWARE

For a lot of fun on your BBC — join our club

Members program listings, competitions, special offers, jokes and snippets of news and comments.

We have a vast selection of games, utility and business software...

Over 150 titles currently in stock!

THE STATACOM TOP 10

Rocket Raid (Acornsoft)

Planetoid (Acornsoft)

Arcadians (Acornsoft)

Snapper (Acornsoft)

Castle of Riddles (Acornsoft)

Alien Dropout (Superior Software)

Centipede (Superior Software)

Painter (A & F Software)

The Golden Baton (Molimerx)

Arrow of Death (Molimerx)

OTHER FAVOURITES

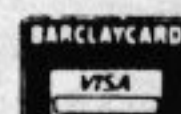
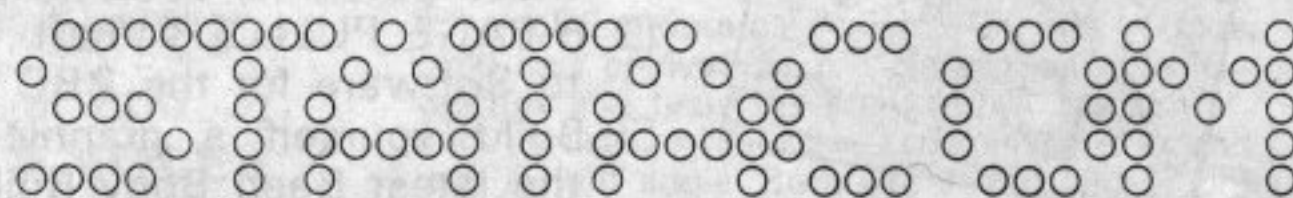
Wordwise, Logo, EDG Graphics, Jumbo, Chess, Cash Book
Accounting, Mail List, Stock Control.

DISC DRIVES: From £265 — LVL (Shugart), TEAC
& Torch (Z80 pack).

PRINTERS: Oki Microlines a speciality, also Seikoshas, Epsoms
(the new FX80), the Spark Jet Printer and others.

MONITORS: Microvitec's CUB & Portatel's Luxor 14"
TV/Monitor.

ACCESSORIES: Joy sticks, Cassette players, Cassette boxes,
Cables, Digitisers, Dust Covers and "The Plug".



STATACOM LIMITED.
234 HIGH STREET,
SUTTON,
SURREY,
SM1 1NX.

Telephone/Mail Orders Welcome : 01-661 2266

FORMAT YOUR PROGRAM LISTINGS

THE need for this program arose while I was trying to decipher some program listings which I hadn't looked at for some time. Even with the LIST option on, long program "lines" often break up keywords and wrap over onto the next line below the line numbers, making the listing look very untidy and difficult to follow.

The program following is an attempt to tidy up these listings.

It will:

- Divide up multi-statement lines.
- Not split keywords.
- Insert spaces after keywords unless this alters the meaning of the statement, for example, after FN there must be no space before the function name.
- Indent statements if the line overflows onto the next.
- Page a printer and write a heading.
- Work with Basic programs saved on both disc and cassette filing systems.

Select the file system required before typing RUN.

At the moment the program is set for a maximum width of 38 characters so that it will work in Mode 7. With standard computer printer paper this leaves a margin on the right which is very useful for documenting your program.

You can remind yourself what you did without having to use too many REMs.

Before examining the program we'll have a brief look at how Basic is stored in memory.

The first byte of a line is always &D.

The second and third bytes hold the line number in binary format. If the second is &FF this shows that this is the end of the program.

The fourth byte is the offset value

JIM NOTMAN shows you how

to the start of the text on the next line.

The line statements follow:

The Basic keywords are represented in the form of tokens, all of which have a value more than 127. Teletext allows characters to have a value more than 127, but these must be enclosed by quotes, otherwise they will be misinterpreted by Basic.

Numbers (for example after GOTO) which occur within a line are stored in a complicated form in three bytes preceded by the token &8D.

The information giving the line number, which could have been stored as a two byte integer, is stored in three bytes instead.

Bit 6 of each of these bytes is set. One reason for this is to prevent Ascii control characters from appearing within a line.

Also, since the line numbers are

always the same length, RE-NUMBERING is made easier (see Figure 1).

The other characters will have Ascii values 32 to 126, representing variables and expressions.

LOOKING AT THE LISTING

C% = Character to be decoded.

L% = Last character printed.

S% = File system in use, set in line 420.

O% = Offset to beginning of statements of next line number.

R% = Repeat loop counter.

MAX = Maximum number of columns on the screen. It's best not to come right to the edge of the screen as extra line feeds may be inserted by the operating system.

P = Printer control.

FILES = File name.

D%,D\$ = Disc drive number.

PROGRAM MAP

10-140 Set up parameters and open file. Select printer.

170 Check first byte. With a Basic file this will be character 13.

180-230 The next two bytes give the line number in binary form.

240-250 The next byte is the offset to the statements of the next line.

260-370 The main body of the program, which decodes the line statements.

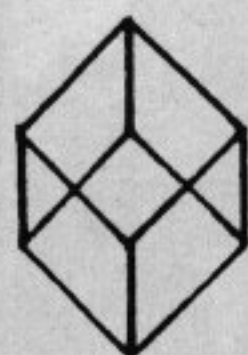
290 If the token is &8D then decode the line number.

300 Check to see if the character is

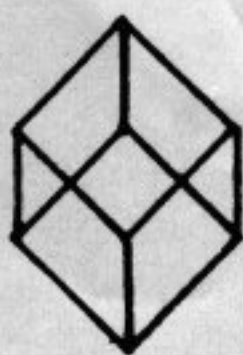
Bit values of the three byte line number

Bit	7	6	5	4	3	2	1	0
Byte 1	0	Always set	128	NOT 64	0	NOT 16384	0	0
Byte 2	0	Always set	32	16	8	4	2	1
Byte 3	0	Always set	8192	4096	2048	1024	512	256

Figure 1



Dimension Software



PROGRAMMERS!

Have you written any good original software for the BBC Micro?

We will pay 30% royalties on Games, Educational, Business and Utility Programs.

Suitable programs will be well packaged and professionally marketed throughout U.K. We also anticipate a lively market in America in the near future.

For a speedy reply send your program on cassette (please include plenty of REMs as this will assist us when converting to machine code) to:-

DIMENSION SOFTWARE

Lamport, Stowe,
BUCKS. MK18 5ED.

All material received will be returned.

★ EASY GRAPHICS ★

Easy Graphics makes the graphics facilities on your BBC micro (32K) easily accessible, even to non-programmers. All commands are entered from the keyboard, and allow you to draw maps, graphs, technical drawings, computer art, even animated pictures. Loads from cassette.

Here are some of the features:

- ★ Draw lines (any thickness), boxes, circles, ellipses, arcs, and many more.
- ★ Measure distances and angles, find x,y coordinates.
- ★ Full cursor control, including on/off and variable speed.
- ★ Fill or shade any shape.
- ★ Change colour and/or palette, dozens of extra colours + shades available.
- ★ Change mode (works in modes 0,1,2,4 or 5).
- ★ Auto repeat facility (probably the most powerful feature).
- ★ Amazing rubber band (helps with perspective).
- ★ Mix text and graphics.
- ★ Save on tape and use in your own programs.

EASY GRAPHICS was originally written as a programming aid, but has now been fully developed into what is probably the most versatile graphics program on the market. Must be seen to be fully appreciated.

EXCELLENT VALUE AT ONLY £13.50.

Includes demonstration program, program generator (allows you to redraw your pictures) and full instructions.

Write for more details or send cheque/PO to:

HEXAGON SOFTWARE

17, Straits Road, Gornal, Dudley, West
Midlands, DY3 2UR.
Telephone: 232992.

Mail Order only. P&P included.

B.B.C. ACORN COMPUTERS

Specialists on hardware and software

* Fully authorised ACORN-BBC Dealer *

** Complete after sales service – repairs and maintenance contracts **

BBC Model B Microcomputer	£399.00	BBC Model B+Econet Single Disc Drive (DAC 100K)	447.51
BBC Model B+Disc Interface	470.51	Dual Disc Drive (BBC 400K+ 400K)	213.00
BBC Disc Interface Kit	£97.75		800.00
Dual Disc Drive (DAC 100K + 100K)	402.50		

(All disc drives come complete with manual, utilities disc and interconnecting cables)

Complete upgrade A to B (including full test) £91.00 Partial upgrades at equally attractive prices

We have a wide selection of Printers including EPSON FX80, RX80, Shinwa CTI CP80, Seikosha GP100, GP250 etc. in stock prices from £200.

14" Colour Monitors	269.00	12" Monochrome Monitor	100.00
Games joysticks	19.50	BBC Paddles	16.00
Data Cassette Recorders	£39.00		

Most of the best software in stock including Acornsoft, Programpower, Bugbyte, Computer Concepts, Superior Software, Nibblesoft, Fisher-Marriott etc.

A wide selection of Books, Magazines and accessories. See a demonstration of the PLS Digitiser – £120.00

All our prices include VAT but please add £3.00 postage for any major item (computers, monitors, discs etc.)

* Please call and visit our new showrooms at:-

D.A. Computers Ltd.,
104 London Road, Leicester.

(2 mins from Railway Station)

Telephone: (0533) 549407

SEE US ON STAND 39 AT BBC MICRO
USER SHOW IN MANCHESTER

BBC SOFTWARE

Quality Software produced by professionals and used in hundreds of schools throughout Great Britain.

FUN WITH WORDS B £8.05
Start your fun with alphabet puzzles in ALPHA. Continue your play as you learn about VOWELS, know the difference between THERE and THEIR and have games with SUFFIXES. After working so hard reward yourself with games of HANGMAN. Learning should be fun. The tape includes ALPHA, VOWELS, THERE?, SUFFIXES and HANGMAN.

EDUCATIONAL - 1 A or B £8.05
Hours of fun and learning for children aged 5 to 9 years. Animated graphics will encourage children to enjoy maths, spelling and telling the time. The tape includes MATH1, MATH2, CUBECOUNT, SHAPES, MEMORY (Model B only), SPELL and CLOCK.

EDUCATIONAL - 2 A or B £8.05
Although similar to Educational - 1 this tape is more advanced and aimed at 7 to 12 year olds. The tape includes MATH1, MATH2, AREA, MEMORY (Model B only), CUBECOUNT and SPELL.

GAMES OF LOGIC & CUNNING A/B £9.20
For children and adults alike. The tape includes AUCTION, FLIP, REVERSE, TELEPATHY and HEXA15 (Model B only).

SUPERLIFE B £9.20
Fast (machine code) version of a popular 'Game of Life' in a large universe.

KATAKOMBS B £9.20
Are you cunning enough to discover and seize the treasure in the Katakombs AND return alive? What and where are your enemies? Can you outwit them? Yes? Then your adventure will take you through unending forests, besides tumbling streams, over lonely plains to desolate ruins and finally underground to the tortuous Katakombs. Be prepared for anything!

UTILITIES A/B £8.05
Behind the mundane title lies an assortment of useful procedures and functions which can save you hours/days of programming effort: date conversion, input and validation routines, graphic routines (cube, rectangle, etc), sorts, search and many more.

***** SPECIAL OFFER ***** Any 3 cassettes for £20.70
Add 50p p/p per order. Please state your model.
DISCS – TORCH Z80 pack – 800K, second processor with 64K RAM, CP/M* compatible operating system plus system software £890 incl. of VAT

Delivery free within 30m radius otherwise £10 delivery charge.
Cheque/P.O. to **GOLEM LTD, Dept B 77 Qualitas, Bracknell,**
Berks, RG12 4QG. Telephone: (0344) 50720

From Page 93

an Ascii control one. If so, print an error message.

310 If byte is 58 (a colon) then go to next line.

320 If byte is 34 (quotes) go to quotes procedure.

330 If byte is &80 or more it is a token, otherwise it is a printing character.

340-350 Update line count and check to see if the line end has been reached.

370 See if end of file has been reached.

380-400 Close file. Option of looking at another file.

370 The (GET AND &F) makes the program respond to both upper and lower case "y".

400-500 PROCinit.

420 Save space for token table, and locations for working out line numbers in line statements.

440 D\$ used by the disc system, defined as a null so that this program may be used with the tape system as well. MAX is the maximum number of characters on a line.

450 This is the way the computer

works out which filing is active when the program is RUN with a CALL to OSARGS. S%=1 with 1200 baud TAPE, S%=2 with 300 baud TAPE, S%=4 with disc system.

470-490 These lines will set up the printer output for RS423, 150 baud and give line feeds. Replace these with your printer setup routine if required.

510-630 The routine that decodes the rather complicated manipulation of a line number held in text.

640-690 Compiles an array holding the keywords by looking at the keyword table in Basic.

670 Most of the keywords have a space added to them except those which end with a '(' or those where a space is not allowed, for example after PROC.

700-760 Prints out tokens after checking line position, or THEN or ELSE, when it goes onto the next line first.

710 Will not print out a token if less than eight spaces left so as not to break the longest keyword.

770-840 Outputs a character after checking line position and the last character output.

850-960 Outputs characters within quotes after checking line length, but does not add or remove spaces.

950 A "letout", just in case you forgot to close quotes at the end of the line.

970-1020 Moves onto the next line, but not if it has just moved to a new line. Indents margin if the program line is not complete.

1030-1060 Used to page the printer. Prints 60 lines including heading. Scrolls down six lines between pages.



THE advent of BBC Basic II has caused some changes in Basic locations. If you wish to run this program under Basic II you must make two alterations.

In line 650, A% = &806D should be replaced by A% = &8071

Similarly in line 660, UNTIL A% > & 8358 should be replaced by UNTIL A% > & 835B

Remember also that the program is set up for a serial printer. The lines you need to alter for a parallel printer are given in the text.

Formatter listing

```

10 REM Jim Notman 1983
20 MODE 7
30 PRINT "'FORMATTER FOR PRINTER
   LISTINGS"
40 PRINT "'Initialising...."
50 PROCinit
60 CLOSE #0
70 IF SZ=4
   THEN REPEAT
     :INPUT "Drive # ",DZ
     :UNTIL DZ>=0AND DZ<=1
     :D$=":"+STR$(DZ)+". "
80 IF SZ<3
   THEN PRINT "'Put the program
     tape into the cassette""unit."
90 INPUT "File name ",FILE$
100 IF SZ<3
   THEN PRINT "'(after rewinding
     your tape)""PRESS PLAY"
110 Z=OPENUP (D$+FILE$)
120 IF Z=0
   THEN PRINT "'FILE NOT FOUND"
     :GOTO 60
130 PRINT "'Printer (Y/N) ";
   :P=GET AND &DF
   :IF P<>89 AND P<>78
     THEN 130
140 IF P=89
   THEN VDU 2,15
     :PRINT TAB(10)FILE$;TAB(MAX-8)
     "Page ";page'
     ELSE VDU 3,14
     :PRINT ''
150 REPEAT
160 CZ=BGET #Z
170 IF CZ<>13
   THEN VDU 3,7
     :PRINT "'NOT A BASIC PROGRAM"
     :CLOSE #0
     :STOP
180 CZ=BGET #Z
190 IF CZ=255
   THEN 380
200 NZ=CZ*256
210 CZ=BGET #Z
220 NZ=NZ+CZ
230 PRINT TAB(5-LEN (STR$(NZ)));NZ;
   " ";
240 CZ=BGET #Z
250 OZ=CZ-4
   :RZ=0
   :LZ=32
260 REPEAT
270 CZ=BGET #Z
280 IF COUNT <6
   THEN PRINT TAB(6);
290 IF CZ=&8D
   THEN PROCtextnumber
     :GOTO 340
300 IF CZ<32
   THEN VDU 7
     :PRINT "'?ERROR (ascii in text)"
     :CLOSE #0
     :STOP
310 IF CZ=58
   THEN PROCnextline
320 IF CZ=34
   THEN PROCquotes
     :GOTO 340
330 IF CZ<127
   THEN PROCchar(CZ)
     ELSE PROCtoken(CZ)
340 RZ=RZ+1
350 UNTIL RZ=0Z
360 IF P=89
   THEN line=line+1
     :IF line>=60
     THEN PROCpage
370 UNTIL EOF #Z
380 CLOSE #0
390 VDU 13,3
   :PRINT "'End of program file."
400 PRINT "'Format another program
   (Y/N)?"
   :IF (GET AND &DF)=89

```


From Page 95

```

THEN VDU 12
:line=1
:page=1
:GOTO 60
ELSE VDU 7,12
:END
410 DEF PROCinit
420 DIM T$(128),E 3
430 PROCtable
440 D$=""
:MAX=38
450 AZ=0
:YZ=0
:SZ=USR (&FFDA) AND &F
460 line=1
:page=1
470 *FX8,2
480 *FX5,2
490 *FX6,0
500 ENDPROC
510 DEF PROCtextnumber
520 IF COUNT >(MAX-5)
THEN PROCnextline
530 !E=0
540 CZ=BGET #Z
550 IF (CZ AND &20)<>0
THEN !E=&80
560 IF (CZ AND &10)=0
THEN !E=!E OR &40
570 IF (CZ AND 4)=0
THEN E?1=&40
580 CX=BGET #Z AND &3F
590 ?E=?E OR CZ
600 CZ=BGET #Z AND &3F
610 E?1=E?1 OR CZ
620 PRINT !E;" ";
:RZ=RZ+3
:LZ=32
630 ENDPROC
640 DEF PROCtable
650 W$=STRING$(10," ")
:AZ=&806D
:REPEAT
:W$=""
:REPEAT
:W$=W$+CHR$ (?AZ)
:AZ=AZ+1
:UNTIL ?AZ>&7F
660 T$(?AZ-&80)=W$
:AZ=AZ+2
:UNTIL AZ>&8358
670 FOR IX=0TO 127
:IF NOT (IX=114OR IX=36 OR
RIGHT$(T$(IX),1)="(")
THEN T$(IX)=T$(IX)+" "
680 NEXT
690 ENDPROC
700 DEF PROCtoken(CZ)
710 IF COUNT >MAX-8
THEN PROCnextline
720 IF CZ=140OR CZ=139
THEN PROCnextline
730 IF COUNT <6
THEN PRINT TAB(6);
740 PRINT T$(CZ-&80);
750 IF RIGHT$(T$(CZ-&80),1)=" "
THEN LZ=32
760 ENDPROC
770 DEF PROCchar(CZ)
780 IF COUNT >MAX
THEN PROCnextline
790 IF (COUNT >(MAX-5)AND CZ=32)
THEN PROCnextline
800 IF (CZ=32 AND LZ=32)
THEN ENDPROC
810 IF COUNT <6
THEN PRINT TAB(6);
820 PRINT CHR$ (CZ);
830 LZ=CZ
840 ENDPROC
850 DEF PROCquotes
860 IF COUNT >MAX-5
THEN PROCnextline
870 PRINT CHR$ 34;
880 REPEAT
890 CZ=BGET #Z
900 IF COUNT <6
THEN PRINT TAB(6);
910 IF COUNT >MAX-5 AND CZ=32
THEN PROCnextline
920 IF COUNT >MAX
THEN PROCnextline
930 PRINT CHR$ (CZ);
940 RZ=RZ+1
950 UNTIL CZ=34 OR RZ=0Z
960 ENDPROC
970 DEF PROCnextline
980 IF COUNT =6
THEN ENDPROC
990 IF RZ>0Z-2
THEN ENDPROC
1000 PRINT 'TAB(6);
1010 LZ=32
:IF P=89
THEN line=line+1
:IF line>=60
THEN PROCpage
1020 ENDPROC
1030 DEF PROCpage
1040 line=1
:page=page+1
1050 PRINT '""""""TAB(10)FILE$;
TAB(MAX-8)"Page ";page'
1060 ENDPROC

```

GAMES WANTED

"Everyone has got at least one novel inside him, and every BBC Micro owner has at least one original game waiting to be programmed." — **Zen in the Art of**

Computer Programming.

So says our editor in his forthcoming book. Is he correct though? Have you got a games program locked away in your subconscious, just waiting to see the light of day?

If so, get in touch with us right away — we're only too willing to hear from you. And

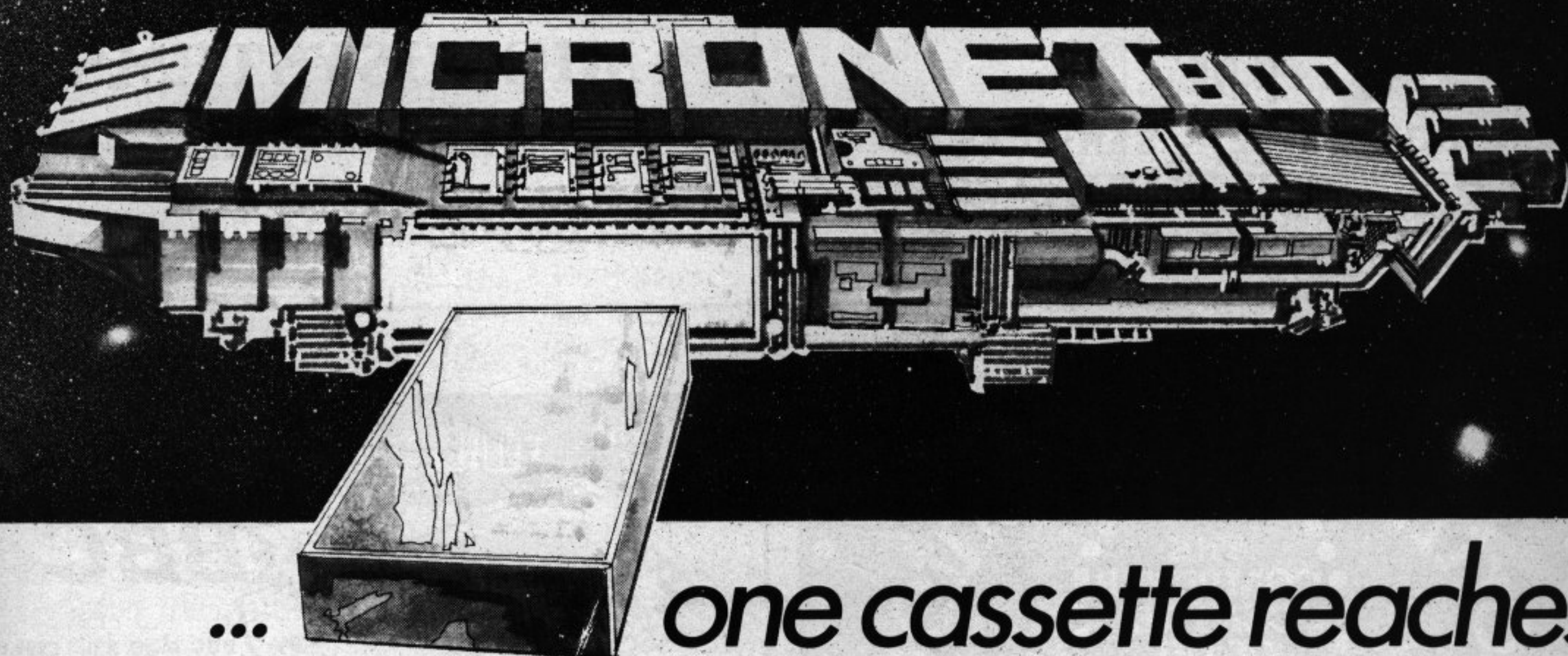
we've got our team of experts ready to help evaluate your work and add any necessary finishing touches.

Of course, if it's good enough, we shall want to include it in the pages of BBC Micro User. So send a copy of your original games program, on cassette or disc, to:

*The Editor, Micro User, Europa House,
68 Chester Road, Hazel Grove, Stockport.*

And please mark your envelope clearly "GAME".

Dock your games software into Britain's largest home-user database...



... *one cassette reaches
thousands of enthusiasts.*

Micronet 800 is a powerful new service that opens up a whole new world of opportunities for microcomputer users.

When this huge database was launched just a few months ago, it attracted thousands of enquiries from home computer enthusiasts who could see the huge new vistas when you link microcomputers with Micronet 800...an 'Aladdin's Cave' of hundreds of games programs which can be downloaded to individual machines...hundreds of thousands of pages of news, reviews, product data and prices from the computer world and from *Prestel*...and an electronic mail-box for exchanging messages and ideas with other users right across the country.

All this for around a modest 15p a day. Subscribers are linked by telephone through a modem, making it the fastest and most direct means of selling your games software downline to the BBC Micro.

Make a name for yourself in games software. Send your disk or cassette, together with the coupon to Micronet 800 at the address below.* We will validate the program, and let you know what you stand to gain from Micronet 800.

**micronet
800**

Micronet 800
Bushfield House
Orton Centre
Peterborough PE2 0UW

Name _____	
Address _____	
Tel: _____	
Name of Program _____	Type of Micro _____
Type of Program _____	
<input type="checkbox"/> Please tick box if you are interested in becoming a Micronet 800 subscriber.	

BBC 7/83

*We cannot return cassettes or disks unless a stamped addressed envelope is enclosed.

MP

B.B.C. MICRO SOFTWARE

"FIRIENWOOD"
£6.50 + VAT

Journey on a quest for the Golden Bird of Paradise in this adventure game. Travel through caverns and a forest in a land of monsters and magic where death waits around every corner.

"SURVIVOR"
£6.50 + VAT

You are shipwrecked on a tropical island in this unusual adventure game. Can you survive and escape back to civilisation, or will you end up in someones cooking pot. Try it if you dare!!! Written in machine code.

"SWAMP MONSTERS"
£6.50 + VAT

A fantastic high speed game in machine code with full colour and sound. Can be played with or without joysticks. Guide your robot through an alien swamp and try to destroy the monsters that inhabit it. (Model B or 32K Model A + User Port).

"SPACEGUARD"
£6.50 + VAT

Your ship is trapped by aliens in this great space game. Your only chance is to destroy them whilst avoiding the mines they are laying. Can be played with or without joysticks. Mode 2 graphics and sound. (Model B or 32K Model A + User Port).

"INVADERS"
£6.50 + VAT

A fast moving space game, compiled in machine code. It utilises mode 2 colour graphics and sound.

All programs require 32K and run on all operating systems. Disc versions now available, ask for details. Prices include postage within U.K. Send S.A.E. for full range of programs and price list or ask your local dealer.

Trade enquiries welcome.

**ALL PRICES INCLUDE POSTAGE. CHEQUES
AND POSTAL ORDERS PAYABLE TO: M.P. SOFTWARE.**

MP

SOFTWARE & SERVICES

**DEPT. BM, 165 Spital Road,
Bromborough, Merseyside L62 2AE.
Telephone: 051-334 3472**

BBC

Your Official Thames Valley Dealer

Contact us for all your BBC
Microcomputer requirements.

We supply:

**Service, Support, Demonstrations,
Advice, Sales.**

Full range of Hardware and Software
available from:

**P.J.
MICROSYSTEMS**

**14 Wood End Crowthorne, Berks.
RG11 6DQ.
Telephone: (0334) 772351**

northern computers
**THE
COMPUTER
CENTRE
OF THE
NORTH**



**THE
showroom
for all the
leading
micros**

easy parking off the M56 (junc 12) * VIC 20 * VIC 64

* BBC micros * Newbrain * Acorn Atom * Books
* Apple 11e, 111 * Dragon * Electron * Games
* Sinclair Spectrum, * IBM P.C.

Secondhand computers * EASY PAYMENTS
ALL ACCESSORIES SALES AND SERVICE *

northern computers Churchfield Road,
FRODSHAM
Cheshire WA6 6RD

TEL: FRODSHAM (0928) 35110
UNBEATABLE PRICES

WE WILL PURCHASE AND PUBLISH YOUR PROGRAMS: Call Steve Rhodes for details

**BUY THE
BEST**

TWILLSTAR COMPUTERS



**IN
STOCK**

BBC

BBC MOD A £299.00
BBC MOD B £399.00

DISC DRIVES
Business Software
Educational Software
Entertainment Software
ONLY £195

ACORN
THE SPECIALISTS

ORIC-1

THE REAL COMPUTER SYSTEM
48K £155.00 INC. VAT ONLY

Silver Reed EX44 now available for the BBC.
A quality daisy wheel printer/typewriter for
only £399.00 + VAT. Inc. RS232 Interface
with 2K Buffer or Parallel Interface with 2K
Buffer.



**SINCLAIR
SPECTRUM**
16K £99.00
48K £125.00

Dragon 32 £195

PRINTERS
Dot Matrix

Epson MX 100 FT III Acorn AP 100 A
Epson RX 80 Seikosha GP100 A
Epson FX 80 **BEST PRICES EVER**

commodore

Printer Cables, Leads, Discs, Stationery,
Cassettes, Ribbons, Dust Covers and wide
range of Software for all Computers.

COMPUTERS
COLOUR MONITORS
14" Microvitek £250
GREEN MONITORS
Sanyo £99.00 Hitachi £99.00

COMPUTER BOOKS & ELECTRONIC MAGAZINES
SOFTWARE, HARDWARE
SUPPORT/SERVICES/RENTALS

CALL IN FOR FURTHER DETAILS
TWILLSTAR COMPUTERS LTD.
17 REGINA ROAD, SOUTHALL, MIDDX.

TEL: 574 5271 (24 hours)
OPEN 10am-8pm SIX DAYS A WEEK



Tenpins listing

From Page 43

```

5 REM
  : "TENPINS" A. Phillips (3/83)
10 ON ERROR RUN
20 MODE 7
30 PROCinit
40 PROCmain
50 PROCend
60 MODE 7
70 END
80 DEF PROCinit
90 VDU 23;8202;0;0;0;
100 *FX11,0
110 *FX4,1
120 DIM SZ 7
130 DIM BALL1%(1),BALL2%(1),CSTR%(1),
    OSTR%(1),SPR%(1),B%(1),NSTR%(1),N
    SPR%(1),SCORE%(1),M%(10)
140 F%=0
150 !SZ=&08040201
160 SZ!4=&4010
170 ENVELOPE 1,1,10,20,-30,10,5,15,12
    7,-2,0,-1,127,100
180 ENVELOPE 2,3,0,0,0,0,0,0,127,-10,
    -5,-2,120,120
190 ENVELOPE 3,5,16,12,8,2,1,1,10,-10
    ,0,-10,200,100
200 ENVELOPE 4,5,0,0,0,6,3,3,127,-5,-
    5,-5,120,60
210 FOR I%=0 TO 23
  :PRINT TAB(0,I%)CHR$ 148;
  CHR$ 157
  :PRINT TAB(11,I%)CHR$ 156
  :PRINT TAB(29,I%)CHR$ 148;
  CHR$ 157
  :NEXT
220 FOR I%=0 TO 23
  :PRINT TAB(10,I%);CHR$ 151
  :NEXT
230 FOR I%=3 TO 74
  :PROCplot(28,I%)
  :PROCplot(50,I%)
  :NEXT
240 FOR I%=1 TO 8
  :READ X%,Y%,L$
  :PRINT TAB(X%,Y%)CHR$ 131;L$
  :NEXT
250 PROCprint(1,21,130,"PLY 1")
260 PROCprint(30,21,130,"PLY 2")
270 FOR P%=0 TO 1
  :PROCscore
  :NEXT P%
280 FOR I%=1 TO 10
  :READ M%(I%)
  :NEXT I%

```

```

290 ENDPROC
300 DEF PROCplot(X%,Y%)
310 LOCAL C%,AZ
320 VDU 31,X% DIV 2+1,24-Y% DIV 3
330 C%=SZ*((X% AND 1)+(2-Y%MOD 3)*2)
340 AZ=135
350 VDU (USR &FFF4 AND &FF00)
    DIV 256 OR C% OR 128
360 ENDPROC
370 DEF PROCmain
380 FOR F%=1 TO 10
390 FOR P%=0 TO 1
400 PROCpins
410 PROCscore
420 PROCgo
430 PROCscore
440 PROCwait(300)
450 PROCpins
460 NEXT P%
470 NEXT F%
480 FOR P%=0 TO 1
490 IF CSTR%(P%)=B%(P%) OR SPR%(P%)=B
    %(P%) PROCextra
500 NEXT P%
510 ENDPROC
520 DEF PROCgo
530 PROCind
540 IF BALL1%(P%)=10
    THEN BALL2%(P%)=10
550 BALL1%(P%)=0
  :PROCbowl
560 BALL1%(P%)=Fntot
570 IF BALL1%(P%)=10 PROCcalc
  :PROCstrike
  :GOTO 630
580 PROCcalc
590 PROCbowl
600 BALL2%(P%)=Fntot-BALL1%(P%)
610 IF Tot%=10 PROCspare
620 PROCcalc
630 SCORE%(P%)=SCORE%(P%)+Tot%
640 ENDPROC
650 DEF PROCind
660 SOUND 1,3,100,25
670 IF P%=0
  THEN PRINT TAB(3,19)CHR$ 136;

```

```

CHR$ 147;CHR$ 57;CHR$ 137
TAB(34,19)CHR$ 148;CHR$ 255
ELSE PRINT TAB(4,19)CHR$ 148;
CHR$ 255TAB(33,19)CHR$ 136;
CHR$ 147;CHR$ 102
680 ENDPROC
690 DEF PROCbowl
700 B%(P%)=B%(P%)+1
710 R=RND (-TIME )
  :CR%=TRUE
  :HT%=FALSE
720 PROCinp
730 PRINT TAB(8,24)CHR$ 129;"PRESS
    SPACE BAR TO BOWL";
740 REPEAT
  :G%=GET
  :UNTIL G%=32
  :PRINT TAB(8,24)SPC (24);
750 FOR Y%=2 TO 74
760 PROCweigh
770 IF HT%
  THEN PROCdef
780 IF X%<=29
  THEN X%=26
  :GOTO 810
790 IF X%>=49
  THEN X%=52
  :GOTO 810
800 IF FNch(X% DIV 2+1,24-Y%
    DIV 3)="^" PROCbit
810 PROCplot(X%,Y%)
820 FOR T%=1 TO D%
  :NEXT
830 VDU 127
  :NEXT
840 PROCcheck
850 IF Fntot=BALL1%(P%) AND BALL1%(P%
    )<>10
  THEN SOUND 1,2,20,10
  :SOUND 1,2,5,20
860 ENDPROC
870 DEF PROCstrike
880 OSTR%(P%)=CSTR%(P%)
  :CSTR%(P%)=B%(P%)

```

This listing was produced by a Jim Notman formatter, which breaks one program line over several lines of listing. When entering a line don't press Return till you come to the next line number. Full details of the formatter are given in the article on Page 93.



PAEAN systems

Quebec Marketing MU, Little Bealings,
Woodbridge, Suffolk IP13 6LT.

PAEAN are hunting for high quality, imaginative and exciting programs for the BBC Micro to market in the UK and overseas.

If you have written an original games, educational or business program which you believe has commercial potential, send a cassette to PAEAN Systems and if we agree with you, we will offer you a contract. Don't forget to include your name, address and telephone number.

Think about this:

A £50 note will be sent to the first response which correctly interprets the hidden significance of the PAEAN Logo.

Winner's name will be published.

40% ROYALTIES

Paid to the writers of high quality, original software, including: Games, Educational and Business Programs.
FOR USE ON THE BEEB.

Don't delay make contact today with

GLENGARY-SOFT

9 Highfield Crescent, Hornchurch, Essex,
RM12 6QB.

Telephone: Hornchurch (04024) 40864

Sherston Software offer a range of educational programs designed by primary school teachers and written by professional programmers. It is our policy to produce high quality programs at reasonable prices.

Short Vowel Sounds: BBC Model B and Spectrum 48K. A very comprehensive program to practice short vowel sounds using simple words and pictures. Options include diagnostic, practice and final assessment modes. The speed, number of retries and weighting on particular vowels can all be altered. Nicely presented with graphics and sound effects. £7.00.

Word Builder 1: BBC Model B. Word Builder builds up words exactly as children should and shows the sequence on the screen for the children to sound out and read at their own speed. Includes sections on initial consonants and short vowel sounds, consonant blends and digraphs, double consonants and vowel-consonant digraphs. Presented in large, colourful, lower case letters. £4.00.

Word Builder 2: BBC Model B. As word builder 1, but introducing vowel digraphs, £4.00 (or £6.00 for both Word Builders).

Maths Snap: BBC Model B. A 'game' for 1,2,3, or 4 players to practice number bonds. Options include addition, subtraction, (or both), multiplication and division (or both) all at five levels of difficulty. The time allowed and the number of questions per game can both be altered making it suitable for all ability levels. Children love it! £6.00.

All programs have been thoroughly tested in the classroom and are accompanied by full explanatory notes. We trust our customers not to break the copyright laws. If you are not satisfied with our product, return it within seven days and get your money back.

Orders to: **Sherston Software, 1 Noble St., Sherston, Malmesbury, Wilts., SN16 0ND.**

Cheques or P/O's payable to Sherston Software. Allow 28 days for delivery.

CONTEX

Adult Educational Software for the BBC Computer

TYPING TUTOR

Specifically designed for the BBC micro the 90 smoothly graded lessons and the free form option teach and encourage fast touch typing. Intelligently checks for errors, monitors progress, times and makes recommendations. Audio key feedback, metronomic pacing, many user configurable options, full instruction booklet included. **£9.99 inc.**

SPREADSHEET

A complete and versatile 'calc' program and tutorial. Models containing over 1000 elements can be built using up to 26 columns and 99 rows. Equations, constants or text in any element. Emphasis on ease of use includes copy, row/col insert, delete, totals, headers, variables, functions, row colours, save and restore. Tutorial, application examples and documentation of all the Basic program for those who wish also to explore the design. **£7.99 inc.**

Cassette based, professional software. Fast delivery. Deduct £1.50 if both programs ordered together.

Cheques/P.O. payable to

"Contex Computing" (B7)
15 Woodlands Close, Cople, Bedford
MK44 3UE.

RMK
Electronics Ltd

New Milton

● DISC DRIVES – £185.00 inc. VAT + £8.00 Carriage.
Slimline Shugart, cased, manual, leads and format prog.

● BLANK DISCS – £13.80 inc. VAT + 50p Carriage.
Leading Brands – per box of 10

● BUSINESS SOFTWARE – Disc Only
"BRANDPLAN" 80 col: Mode 2400 Cell
Spreadsheet, Sales Ledger, Purchase Ledger,
Games and Utilities.

● HARDWARE
Single or double drive cables, power cables, plugs
and sockets, spares and upgrades. Reliable
Cassette Recorders.

RMK ELECTRONICS LTD

First Floor, Hinton House, Station Road,
New Milton, Hants. BH25 6HZ.

Tel: 0425 616110

DRAGON/32

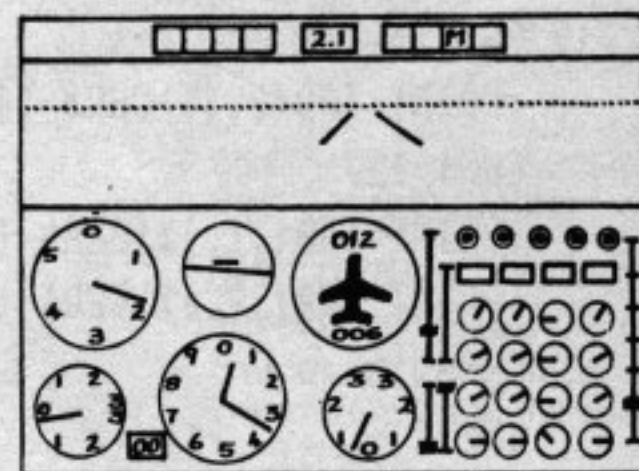
BBC MODEL/B

TRS 80 C/C 32K

747 FLIGHT SIMULATOR

Superbly realistic instrumentation and pilot's view in lifelike simulation which includes emergencies such as engine fires and systems failures. This program uses high resolution graphics to the full to produce the most realistic flight-deck display yet seen on a home computer. There are 21 real dials and 25 other indicators (see diagram). Your controls operate throttle, ailerons, elevators, flaps, slats, spoilers, landing gear, reverse thrust, brakes, etc. You see the runway in true perspective. Uses joysticks and includes options to start with take-off or random landing approach. "A real simulation, not just another game." (Your Computer Apr. 83).

CASSETTE £9.95 (pp and VAT included)



NEW • NEW • NEW • NEW • NEW

BBC MODEL/B ARCADE ACTION GAMES

D.A.C.C. proudly announce the following all-new fast-action arcade style games:-

THE GUNS OF NAVARONE

This one is truly addictive. Defending your clifftop stronghold from attack by helicopters and enemy naval shellfire is no pushover. There are three starting levels and the game also responds to your skills with increasing ferocity of attack. Use your rapid-fire anti-aircraft gun to bring down the choppers, at the same time, set your shell strength and trajectory to blast the advancing destroyer. If a ship gets through your defences to detonate your arsenal of ammunition then you and your guns will suffer devastating explosions. Great colour, animation and sound make this one a real winner.

CASSETTE £7.95 (pp and VAT included)

MERCY MISSION TO MARS

A space battle with a difference. Stretch your firing skills to the limit defending your ship from fast moving "plasmoid" destroyers. If you survive you then have to land your descent module on the Martian surface and pick up personnel pods, take-off again, dodging marauding asteroids and locate the "transporter beam" to ensure safe return of your charges. Ten skill levels in this fever-pitch all action game.

CASSETTE £5.95 (pp and VAT included).

Despatch within 48 hours.

D.A.C.C. LTD., Dept BMU,
23 Waverley Road, Hindley, Gtr. Manchester WN2 3BN.
(15 years professional computer experience)

Tenpins listing

From Page 99

```

890 SOUND 1,1,85,20
900 PRINT TAB(16,2)CHR$ 136;CHR$ 134;
    "STRIKE";CHR$ 137;CHR$ 151
910 NSTRZ(PZ)=NSTRZ(PZ)+1
920 ENDPROC
930 DEF PROCspare
940 SOUND 1,2,149,5
    :SOUND 1,2,165,5
    :SOUND 1,2,129,5
    :SOUND 1,2,165,5
950 PRINT TAB(16,2)CHR$ 136;CHR$ 130;
    "SPARE";CHR$ 137;CHR$ 151
960 SPRZ(PZ)=BZ(PZ)
970 NSPRZ(PZ)=NSPRZ(PZ)+1
980 ENDPROC
990 DEF PROCinp
1000 *FX15,1
1010 PRINT TAB(12,24)CHR$ 131;"Positio
    n ? (0-9)";
    :REPEAT
    :PosZ=GET
    :UNTIL PosZ>47 AND PosZ<58
1020 PRINT TAB(13,24)"Speed ? (0-5)
    ";
    :REPEAT
    :VZ=GET
    :UNTIL VZ>47 AND VZ<54
1030 PRINT TAB(13,24)"Bias ? (L or
    R)";
    :REPEAT
    :SPZ=GET AND 223
    :UNTIL SPZ=76 OR SPZ=82
1040 XZ=30+(PosZ-48)*2
1050 ModZ=(VZ-47)*(RND (2)*5)
1060 DZ=(10-(VZ-48))*25
1070 ENDPROC
1080 DEF PROCweigh
1090 IF SPZ=76
    THEN XZ=XZ+((TIME MOD ModZ=0)
    OR (RND (7+VZ)=4))
    :ENDPROC
1100 XZ=XZ+ABS ((TIME MOD ModZ=0)
    OR (RND (7+VZ)=4))
    :ENDPROC
1110 DEF PROCbit
1120 IF CRZ
    THEN SOUND 0,4,6,3
    :SOUND 0,4,5,10
    :CRZ=FALSE
1130 HTZ=TRUE
1140 ENDPROC
1150 DEF PROCdef
1160 R=RND (3)
1170 IF R=1
    THEN XZ=XZ+2
1180 IF R=3
    THEN XZ=XZ-2
1190 HTZ=FALSE
1200 ENDPROC
1210 DEF PROCcheck
1220 LOCAL GX
1230 IF RND (3)=3 AND BALL1Z(PZ)=0
    AND ?(HIMEM +&8C)=32
    THEN FOR IZ=1TO 10
        :MZ(IZ)?HIMEM =32
    :NEXT
    :ENDPROC
1240 IF Fntot=BALL1Z(PZ) OR RND (2)=1
    ENDPROC
1250 IF BALL1Z(PZ)=0
    THEN GX=9
    ELSE GX=10
1260 FOR IZ=GXTO 5 STEP -1
1270 IF MZ(IZ)?HIMEM =32
    THEN ?(HIMEM +MZ(IZ)-&27)=32
    :?(HIMEM +MZ(IZ)-&29)=32
1280 NEXT IZ
1290 ENDPROC
1300 DEF PROCcalc
1310 IF BZ(PZ)<3 ENDPROC
1320 IF SPRZ(PZ)=BZ(PZ)-1
    THEN SCOREZ(PZ)=SCOREZ(PZ)+BALL1Z
    (PZ)
    :ENDPROC
1330 IF DSTRZ(PZ)=BZ(PZ)-2 OR CSTRZ(PZ)
    =BZ(PZ)-2
    THEN SCOREZ(PZ)=SCOREZ(PZ)+BALL1Z
    (PZ)+BALL2Z(PZ)
1340 ENDPROC
1350 DEF PROCpins
1360 PRINT TAB(16,2)SPC (9)
1370 RESTORE 1970
1380 FOR IZ=1TO 10
1390 READ A,B
1400 PRINT TAB(A,B)"^^"
1410 NEXT IZ
1420 ENDPROC
1430 DEF PROCextra
1440 LOCAL NZ
1450 BALL1Z(PZ)=0
1460 IF PZ=0
    THEN PRINT TAB(2,1)CHR$ 133;
    "EXTRA"
    ELSE PRINT TAB(2,1)CHR$ 148;
    SPC (5)TAB(32,1)CHR$ 133;"EXTRA"
1470 PROCind
1480 IF SPRZ(PZ)=BZ(PZ)
    THEN NZ=1
    ELSE NZ=2
1490 FOR WZ=1TO NZ
1500 PROCbowl
1510 IF WZ=2 GOTO 1540
1520 BALL1Z(PZ)=Fntot
    :IF BALL1Z(PZ)=10 PROCstrike
    :PROCwait(300)
    :PROCpins
1530 GOTO 1570
1540 IF BALL1Z(PZ)=10
    THEN BALL2Z(PZ)=Fntot
    ELSE BALL2Z(PZ)=Fntot-BALL1Z(PZ)
1550 IF BALL2Z(PZ)=10 PROCstrike
    :GOTO 1570
1560 IF TotZ=10 PROCspare
1570 PROCcalc
    :PROCscore
1580 NEXT WZ
1590 PROCwait(300)
    :PROCpins
1600 ENDPROC
1610 DEF PROCscore
1620 IF PZ=0
    THEN XZ=3
    ELSE XZ=33
1630 IF FZ>10
    THEN FZ=10
1640 F$=STR$ (FZ)
    :PROCprint(XZ+(FZ>9),4,133,F$)
1650 F$=STR$ (NSTRZ(PZ))
1660 PROCprint(XZ+(NSTRZ(PZ)>9),8,134,
    F$)
1670 F$=STR$ (NSPRZ(PZ))
1680 PROCprint(XZ+(NSPRZ(PZ)>9),12,134,
    F$)
1690 F$=STR$ (SCOREZ(PZ))
1700 PROCprint(XZ+(SCOREZ(PZ)>9),16,12
    9,F$)
1710 ENDPROC
1720 DEF PROCwait(WZ)
1730 LOCAL TZ
1740 TZ=TIME
    :REPEAT UNTIL TIME =TZ+WZ
1750 ENDPROC
1760 DEF PROCprint(X,Y,C,L$)
1770 PRINT TAB(X,Y)CHR$ 141;CHR$ C;L$
1780 PRINT TAB(X,Y+1)CHR$ 141;
    CHR$ C;L$
1790 ENDPROC
1800 DEF Fntot
1810 TotZ=0
1820 FOR HZ=1TO 10
1830 IF MZ(HZ)?HIMEM =32
    THEN TotZ=TotZ+1

```


Tenpins listing

From Page 101

```

1840 NEXT H%
1850 =Tot%
1860 DEF FNch(X,Y)
1870 LOCAL A%,OX,OY,C
1880 OX=POS
      :OY=VPOS
1890 VDU 31,X,Y
1900 A%=135
      :C=USR (&FFF4)
1910 C=C AND &FFFF
1920 C=C DIV &100
1930 VDU 31,OX,OY
1940 =CHR$ (C)
1950 DATA 3,3,FRM,33,3,FRM,3,7,STK,33,
      7,STK,3,11,SPR,33,11,SPR,3,15,SCR
      ,33,15,SCR
1960 DATA &11,&13,&15,&17,&3A,&3C,&3E,
      &63,&65,&8C
1970 DATA 17,0,19,0,21,0,23,0,18,1,20,
      1,22,1,19,2,21,2,20,3

```

```

1980 DATA 101,101,101,117,101,101,101,
      81,101,117,129,117,101
1990 DEF PROCend
2000 IF SCORE%(0)=SCORE%(1)
      THEN F$=" Drawn game "
      :GOTO 2020
2010 IF SCORE%(0)>SCORE%(1)
      THEN F$="Player 1 wins"
      ELSE F$="Player 2 wins"
2020 PROCprint(12,4,131,F%)
2030 FOR I%=1 TO 13
      :READ P%
      :SOUND 1,-10,P%,2
      :SOUND 2,-10,P%+48,3
      :SOUND 1,0,0,1
      :NEXT I%
2040 PROCprint(9,21,129,"ANOTHER GAME
      (Y/N) ?")
2050 REPEAT
      :G%=GET AND 223
      :UNTIL G%=89 OR G%=78
2060 VDU 12

```

```

2070 PROCprint(7,5,131,"*****
      *****")
2080 FOR I%=7 TO 15 STEP 2
      :PROCprint(7,I%,131,"*")
      :PROCprint(30,I%,131,"*")
      :NEXT I%
2090 PROCprint(7,17,131,"*****
      *****")
2100 FOR P%=0 TO 1
      :IF SCORE%(P%)>Q%
      THEN Q%=SCORE%(P%)
2110 NEXT P%
2120 F$=STR$ (Q%)
2130 PROCprint(10,11,129,"HIGH SCORE
      = ")
      :PROCprint(25,11,132,F%)
2140 PROCwait(600)
2150 IF G%=89
      THEN RUN
2160 *FX4,0
2170 *FX12,0
2180 ENDPROC

```

High Speed A/D STORAGE Interface

Versatile stand alone unit enabling remote recording and storage of signals for later analysis by BBC(B) or oscilloscope.

Non volatile storage (2K RAM). Integral mains supplies. Sampling Rate 100Hz-125KHz. Buffered D/A output. Variable input gain. Converts any oscilloscope into a storage 'scope. Transducers and probes available.

Supplied with Instruction Manual, Operating software and BBC connecting cable.

Price £199 plus VAT & pp



Grafitek Electronics Ltd.,
Dept BU2, 10 Allanmead
Road, Bristol. BS14 9AS.
Tel: 0272 838214

ALL IN
STOCK

S.P. ELECTRONICS

BBC
SPECIALISTS

BBC Model B 1.2 O.S.....	£399
Upgrade Kits A to B	£60
Disc Operating System	£109
Disc Drives	from £228
Cassette Recorders	£18.90
Top quality EMI computer cassettes	from 55p
G3WHO RTTY PROGRAM	£7.50
Circuit boards for RTTY decoder (inc. instructions)	£6.30
Computer Dust Covers	£3.00
CP80 and Star 510 Printers	£343.00
Joysticks (pair)	£13.00
Printer Cable (Centronics)	£12.90

Wide selection of software, books, leads, plugs, etc.

SAE for full list. All available Mail Order

48 Linby Road, Hucknall,
Notts. NG15 7TS.
Tel: 0602 640377

Carriage
extra



(all prices include VAT)

BBC MICROCOMPUTER STATION

Will accommodate the computer, printer, monitor or T.V. and disc unit or cassette.

Cable Clips keep connecting leads tidy.

Dais raises monitor and provides storage for papers, manuals etc.

Castors enable station to be moved easily to different locations.

Dimensions

Working Surface	60 x 55cm
Monitor Dais	48 x 38cm
Shelf	38 x 30cm

Construction: Black brazed steel frame with white Melamine surfaces. Can also be supplied in Teak or Mahogany at small extra cost.

SPECIAL INTRODUCTORY PRICE
£49.95 ALL INCLUSIVE

For full details, send S.A.E. to:

K.J.G. Products, 57, Dapdune Court, Woodbridge Road,
Guildford, Surrey.

BBC MICRO INDEX WHERE TO FIND THAT ARTICLE!

Grouped alphabetical reference to over 1500 published BBC Micro Articles, Program Techniques, Hardware and Software Tips, Utility, General, Music and Games Programs, Clubs, Book Reviews, Commercial Software Reviews, Special Hardware etc, etc.

Price £3 incl. p & p., by return.

**BEEBDEX, 13 Viaduct Road,
Brighton, Sussex.**

DISC USERS

– IF YOU USE DISCS YOU NEED "THE KEY"

A suite of disc utility programs:

1. FORM 40 – Format 40 track discs.
2. FORM 80 – Format 80 track discs.
3. BACKUP – Allows your valuable discs to be backed-up, including most protected discs.
4. EDITOR – Allows the user to alter and customise programs, even those which are not listable.
5. RETRIEVE – Enables the user to recover data or programs that have been accidentally erased.

The real workhorse of the package is EDITOR which allows the user to see a sector in HEX and ASCII, and to then alter that sector and write it back to disc. There is provision for automatic and manual searches of the sector and the instructions contain useful tips on what to look for, and where to look for it. The sector can also be dumped to printer for in-depth analysis.

The program is very easy to use and control is mainly through the function and cursor keys, whilst on-screen prompting provides all the necessary information. One recovered program or a back-up copy that is actually needed will pay for this package, and will continue to show its worth time and time again.

This is the sort of utility that should be provided with every disc drive sold as it becomes indispensable once used. At a price of £12.95 "THE KEY" represents very good value when compared with the many formatting programs being sold for around £10.00

THE KEY – £12.95 (state 40 or 80 track discs)

It is a condition of sale that this program will not be used illegally.

C.A.D. SOFTWARE

Ideal for teachers, designers, artists, technical drawing and numerous other applications including your own form and stationery design etc.

This program must be seen to be appreciated – your imagination is the only factor to limit its individual applications.

- Modes 0,1,2,4,5 (can be changed when program is running).
- Multiple display of arrays enables infinite complexity.
- **FUNCTIONS:** Line, rectangle, triangle, circle, text (upper and lower case) and colour pallet (8 colours and flashing).
- **DRAWING AIDS:** Alignment grid, circle copy, delete, free memory, purge memory, variable cursor speed, clear screen and redraw.
- Shapes can be filled or outlined (no need for Fill Routines).
- Save and load to tape in about 20 seconds, or to disc in 2 seconds.
- **SPECIAL FACILITY** – Rubber band mode – A very flexible and variable line drawing facility – must be seen.
- Free "redraw" routine to enable the pictures created to be displayed in your own programs.
- The disc version allows screen saves, which take approx. 3 seconds.
- **Recommended by BBC Micro User.**
- GRAFKEY (keyboard and joystick cassette version) **£7.95**
- GRAFDISC (disc version) **£12.95**

REPLICA

(Another disc utility program to make your life easier)

This program allows most of the popular machine-code and Basic programs on cassette to be uploaded onto disc and run. The program is very user friendly and almost does away with the need for human intervention. It is presented in such a way that the user does not need to know what is going on, he simply inserts the tape and presses a few buttons when prompted. The programs will be presented in a menu, which is created by the utility, and will auto-boot, just leaving the user to select the required program. Many types of program can be handled with this utility and it is particularly suited to programs that load in several stages or sections. The disc will allow approximately 8-10 programs of similar length to the Acornsoft arcade game to be stored. If additional program space is required, a further disc must be purchased.

REPLICA £9.95

(state 40 or 80 track)

SYNTHESISER (requires PACKAGE 1.2 O.S)

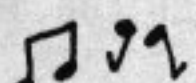
PART 1:-

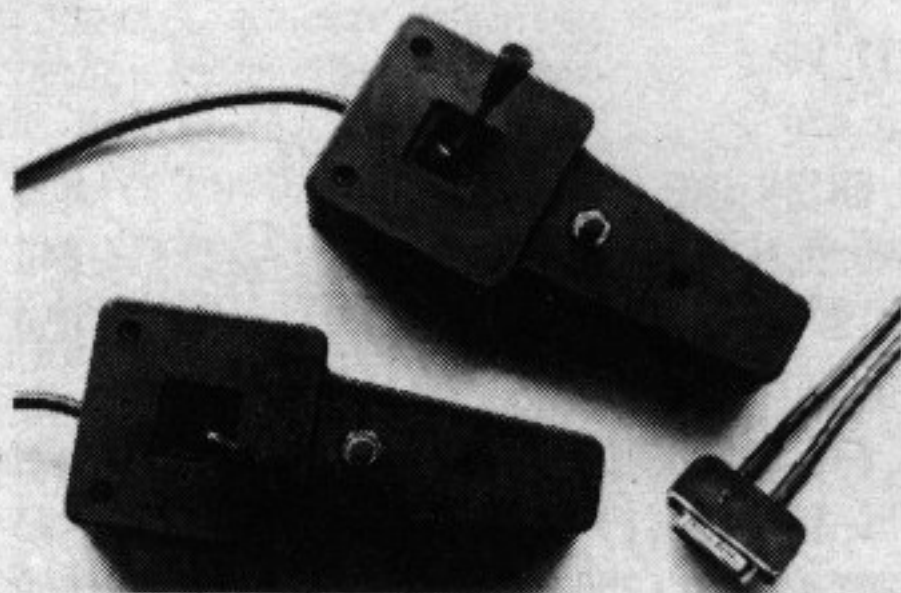
Allows up to 16 envelopes to be defined and saved using a very sophisticated, yet easy to use defining program. Alter the values and hear the effect instantly. Then use the envelopes in Part 2.

PART 2:-

Turns your keyboard into a musical instrument. Lets you play 3-note chords (not just single notes). Use cursor keys to change octaves etc, etc.

Become the Rick Wakeman of the Computer Age.

THIS SUPER PACKAGE COSTS JUST  Cassette **£7.95**
Disc **£10.95**



JOYSTICKS

Pair of fully proportional joysticks of compact and handy size
£17.95

JOYSTICK UTILITY

Converts virtually any program to run with joysticks.

CASSETTE £5.00

EDUCATIONAL CORNER

(for the 5-11 age group)

THE GARDEN – 3 programs with superb graphics. Covers: colours, spelling and understanding. Cassette **£6.95**

COUNTING – robots, rockets, flowers, etc. Excellent graphics, good range. Cassette **£4.95**

MATCHING – 4 programs covering numbers, words, shapes and patterns. Cassette **£5.95**.

PROGRAMMERS

We are constantly seeking new and interesting programs. Why not send yours for appraisal? Do not worry if the presentation is not to professional standards – we are looking for new ideas and we will advise and assist in bringing your program to the required standard. You have got nothing to lose but much to gain – So why not send your program today? 40 Track disc if possible or two copies on cassette. In some cases we will even provide disc drives against future royalties.

CLARES MICRO SUPPLIES



Dept. BMU7, Providence House,
222 Townfield Road, Winsford,
Cheshire CW7 4AX.
Tel: 06065 51374

All prices inclusive of
VAT + Carriage – No Extras.



Space pod listing

From Page 59

```

10 REM *****
20 REM * SPACE PODS *
30 REM *FOR BBC MODEL B*
40 REM *****
50 MODE 7
   :PRINT TAB(10,6);CHR$ 141;
   CHR$ 130"SPACE PODS !";TAB(10,7);
   CHR$ 141;CHR$ 130;"SPACE PODS
   !"
60 PRINT TAB(9,9);CHR$ 131"By N.Timb
   erlake"
70 PRINT TAB(3,16);CHR$ 129"Do you
   want instructions(Y/N)?";
   :G$=GET$
   :IF G$="Y"
   THEN PROCINSTRUCTIONS
80 MODE 2
90 ENVELOPE 1,1,-1,0,0,2,0,0,126,0,0
   , -10,126,126
100 SCORE%=0
   :T=20
110 DEF FNpoint(X,Y)=POINT((64*X+32),
   (32*(31-Y)+16))
120 VDU 23,231,255,126,126,126,126,12
   6,126,255
   :B$=CHR$ 231+CHR$ 231+CHR$ 231+
   CHR$ 231
130 VDU 23,233,129,66,60,66,66,60,36,
   102
140 VDU 23,232,252,252,0,0,0,0,252,252
150 COLOUR 129
   :COLOUR 6
   :CLS
160 VDU 23;8202;0;0;0;
170 VDU 23,230,255,255,255,255,255,25
   5,255,255
180 VDU 23,240,0,0,255,0,0,255,0,0
190 VDU 23;8202;0;0;0;
200 A=-1
210 A=A+1
220 IF A=4
   THEN A=16
230 IF A>19
   THEN GOTO 280
240 FOR B=0 TO 29
250 PRINT TAB(A,B);CHR$ 230
260 NEXT B
270 GOTO 210
280 B=24
290 B=B+1
300 IF B>29
   THEN GOTO 350
310 FOR A=0 TO 19
320 PRINT TAB(A,B);CHR$ 230
330 NEXT A
340 GOTO 290
350 COLOUR 0
360 PRINT TAB(7,28);B$
370 COLOUR 0
380 PRINT TAB(4,8)CHR$ 232
390 PRINT TAB(4,16)CHR$ 232
400 X=RND (11)+4
410 Y=-1
420 G$=INKEY$ (0)
430 IF G$="W" OR G$="X"
   THEN GOTO 530
440 Y=Y+1
450 IF Y>29
   THEN PRINT TAB(X,Y-1)CHR$ 32
   :GOTO 400
460 IF FNpoint(X,Y)=6
   THEN PRINT TAB(X,Y-1)CHR$ 32
   :PRINT TAB(X,Y)CHR$ 32
   :GOTO 400
470 IF Y<>0
   THEN PRINT TAB(X,Y-1)CHR$ 32
480 PRINT TAB(X,Y);CHR$ 233
490 IF Y=28 AND X>6 AND X<11
   THEN PROCEND
500 IF SCORE%>2000
   THEN T=0
510 FOR VB=1 TO T
   :NEXT VB
520 GOTO 420
530 REM WHICH ONE
540 SOUND 0,1,100,1
550 PROCTOP
560 GOTO 420
570 DEF PROCEXPLOSION
580 SOUND 1,1,100,1
590 SCORE%=SCORE%+250
   :PRINT TAB(2,30);"SCORE:";SCORE%
600 Y=0
   :X=RND (11)+4
   :ENDPROC
610 DEF PROCTOP
620 COLOUR 0
630 IF G$="W"
   THEN FY=8
   ELSE FY=16
640 FOR FX=5 TO 15
650 PRINT TAB(FX,FY)CHR$ 240
660 IF FX=X AND FY=Y
   THEN PROCEXPLOSION
670 NEXT FX
680 PRINT TAB(5,FY)"
690 ENDPROC
700 DEF PROCEND
710 RESTORE
720 READ P%
730 FOR A=1 TO 200
   :NEXT
740 IF P%=256
   THEN PRINT TAB(4,14)"YOU ARE
   DEAD"
750 IF P%=256
   THEN PRINT TAB(4,16)"ANOTHER
   GO";
   :INPUT G$
760 IF G$="Y"
   THEN GOTO 90
770 IF G$="N"
   THEN CLS
   :END
780 IF G$<>"Y" AND G$<>"N" AND P%=256
   THEN PRINT TAB(4,16)"
   "
   :GOTO 750
790 IF P%=257
   THEN FOR A=1 TO 200
   :NEXT
800 IF P%<256
   THEN SOUND 3,-15,P%,1
810 GOTO 720
820 DATA 81,69,53,69,81,257,69,257,61
   ,73,49,61,73,257,61,257,81,69,53,
   69,81,257,69,257,33,41,49,53,256
830 DEF PROCINSTRUCTIONS
840 CLS
850 PRINT TAB(10,3);CHR$ 141;
   CHR$ 130;"SPACE PODS !";TAB(10,4)
   ;CHR$ 141;CHR$ 130;"SPACE PODS
   !"
860 PRINT TAB(3,8);"The object of
   the game is to stop thespace
   pods landing and eating their
   way to your base.To stop them
   you have to shoot them down
   with your laser guns.You have
   two laser guns which can be
   fired by pressing ";
870 PRINT "either 'W' or 'X'.Every
   time you hit a space pod,you
   will get 260 points."
880 PRINT TAB(3,20);CHR$ 133"Press
   any key to continue";
   :G$=GET$
   :ENDPROC

```


IN his article on operating system routines Paul Beverley poses the question "Does anybody know what *LINE and *CODE do?" (BBC Micro User No 3 Page 46.) I think I can shed some light on the matter.

Both of these calls indirect through USERV (location &0200) and since USERV is initialised to point at the "Bad Command" message, all they will do is print "Bad Command".

The story doesn't end here though, since this can be used to our advantage.

If the user has a machine code routine placed somewhere in RAM all he needs to do is place the address of that routine in locations &0200 and &0201 and the command *LINE will call his routine. This is because *LINE does nothing but JMP (&0200).

*CODE however is slightly more complicated, and can take two optional parameters which are placed in the X and Y registers before indirection. Thus

*CODE 12, 54

will place 12 in the X register and 54 in the Y register. This can be used to good effect, but be warned that *CODE does seem to perform other operations before indirection – the one I have noticed is that it cancels the effect of the Escape key on the Escape flag.

I hope this information has been helpful, but be warned that although these calls can be used to eliminate the necessity of remembering a start address of a routine they will probably only work like this in OS 1.2.

They may well do something more useful in future operating systems. – N.J. Parker, Leatherhead.

Explanation please

CONGRATULATIONS on your start. You qualify for the "yellow jersey"!

Regarding Jim Notman's 6502 disassembler in Basic, this

Shedding light on *LINE and *CODE

is an impressive program with, I imagine, vast potential for use by the learner.

But where are the explanations on how and when to use the program?

There must be more to it than just seeing the mnemonics of the program itself, plus those of programmed red keys!

How do you use it to probe instructions and error messages in the operating system?

Incidentally, when "memory dumping" various addresses, I was intrigued to find odd (random?) characters at isolated addresses. This applied after several separate cold starts.

Where do they come from? I thought all characters in RAM disappeared on switch-off!

I feel sure the majority of your readers must be as puzzled as I am, and I hope you can find space to educate us on this particular topic. – Ernest Cummins, Blackburn.

● Thanks for the jersey. With all this praise, I doubt I'll get it over my head!

The disassembler was published basically as a tool for exploring the ROM. We felt that people who were into that sort of thing would already know what a disassembler was.

We will, however, be using the disassembler to probe various bits of the ROM to illustrate our machine code course for beginners, and we will have to publish details of its workings there.

I'm afraid that we can't comment on the "phantom characters" without knowing which bit of RAM you were looking at. The micro does use certain areas of its memory as "scratch pads" though, and even when you've just switched

on there's a machine code program – called a bootstrap – that the machine goes through.

Upgrade SOS

AFTER careful study of the Beeb Body Building Course and inspecting the inside I decided it would not be too difficult to carry out this part of the upgrade. The chips could not be obtained locally so were obtained by mail order.

Doing everything with extreme care and step by step the chips were inserted without difficulty.

Unfortunately it did not work, the screen was blank and a continuous note was heard from the speaker. When the link S25 is returned to the original position it still works perfectly as 16k.

I now have a problem and phoned the local official Acorn dealer to seek advice. His response was and I quote, "If you didn't buy the chips from us you can't expect any help."

If this is Acorn's official attitude then you would do well to warn your readers who may be contemplating following your advice to save money by DIY upgrades.

It could be an expensive and humiliating experience to get the computer working again should there be a defect which cannot be identified.

If you recognise the symptoms perhaps you would offer advice.

Congratulations on a well produced and presented magazine. I look forward to future editions with interest. – John Hartley, Kidderminster.

● Mike Cook says he's en-

countered similar problems and they are usually caused by one of three, easily rectified errors:

- One or more of the memory chips may have been put in the wrong way round.

- One of the legs of a RAM chip might just be out of its socket. Look carefully for this, it's easy to miss.

- If the above doesn't work, then some of your new RAM chips are faulty.

The response from your official Acorn dealer seems par for the course.

Down loader doldrums

IT is refreshing to read a magazine on micros without incurring a feeling of inadequacy! As a newcomer to the BBC Micro I welcome your publication and have taken out an annual subscription.

May I request, however, that you remember the beginner when giving out instructions on how to do things. There is nothing more offputting than reading a set of instructions that the writer obviously understands, but you don't.

Now to my problem. I have a Model B with disc interface and 1.2 OS and purchased your first cassette of programs, some of which didn't run. I followed the instructions you gave in the April issue for setting up one of the function keys as a downloader and tried to load programs like Deathwatch.

After pressing the function key there would be a short pause followed by the message **BAD PROGRAM.**

What have I done wrong? I

MICROMAIL

From Page 105

have checked my copy of your program and can find no obvious (to me) mistake. I have still not been able to use Deathwatch after many attempts.

As a suggestion for the future, could we have a review of various word processing ROMs available. I am sure you must have a fund of helpful information that would be of interest to prospective purchasers.

Would it also be possible for you to supply programs both on cassette and disc?

Many thanks to your useful contribution to my education. Keep up the good work. — N. Diaz, Heversham, Cumbria.

● *I have tried, without success, to recreate your problem. Let's go through exactly what downloading is.*

As you know when in operation the disc interface uses part of the RAM. With many programs, particularly those using the "memory eating" modes, you can LOAD them but, when you RUN them, as soon as the program tries to enter the hi-res modes it runs out of space.

The space the disc interface uses is at the bottom of RAM, taking up part of the memory

that would normally be available for programs.

However, once we have loaded the program from disc there is no need to waste this space. We can copy our program down from where it has been loaded to a new position at the very bottom of RAM, overwriting the memory that the disc system takes up.

The program now has available to it as much memory as if it had been typed in or loaded from tape.

Moving the program down in memory like this is known as downloading. It only takes a small program to do this. I attach my downloader, called MOVER, to a function key.

When I want to download a program I first CHAIN "MOVER" to set up the function key. Nothing spectacular happens and I do not, at this stage, press the function key — after all, I haven't got the program I wish to download in the micro yet.

I then LOAD the program I want and follow that by pressing the function key. This brings the downloader into operation.

After a short pause, the cursor returns, showing that downloading is complete and I can now RUN the program.

Incidentally, we've come up

with a rather unusual problem in our downloading: The DFS insists on altering just one byte of a downloaded program.

You can get away with running the program once, but the next time that altered byte will crash the program unless you're lucky. To get round this, at the beginning of the downloader I've added *TAPE to negate the influence of the DFS. Figure 1 contains the new version.

```
1 *KEY 0 *TAPE !M FD
R LOCATIONX=PAGE TO TOP:
?(LOCATIONX-2816)=?LOCATI
ONX: NEXT:PAGE=&E00 !M OL
D !M
```

Figure 1

Paddle landing

AFTER successfully building the games paddle as described in the March issue of your fantastic magazine (grovel, grovel), I decided to convert the Lunar Lander game on page 177 of the User Guide for use with a paddle.

It is, in fact, very easily done, changing lines 180 and 190 to
180 burn = INT (ADVAL (1)/
242)

190 IF burn < 5 THEN
burnrate%= 0

ELSE burnrate%= burn

As the spindle is turned to the right the burn will go up and vice versa. — I. Mabbott, Prescott.

Second thoughts

HAVING read in Micromail R.Y. McNulty's letter on investing in a disc drive and having read that the interface takes up a large amount of memory, I began to think about the 6502 second processor and came up with some queries:

□ *Do you need to tell the computer to use the second processor?*

□ *If you had a program that used more memory than the computer had on board, would the second processor automatically come on-line, or is it constantly on-line?*

□ *Do commercial programs need to have their memory locations changed when the second processor is attached, as in the VIC 20?*

□ *Finally, does the second processor double the speed of any operation?*

Thanks for a great mag. Keep up the good work — Ian Brunt, Newcastle, Staffs.

Bouncing marsupial is safely snared

I'M sitting here at 1am, playing with my Beeb (Mk XXIV ?), feeling very pleased with myself for "cracking" your Kangaroo (a la Mode 7) in the May issue of Micro User.

Obviously you also have a typewriter (wordprocessor?) that makes spelling mistakes. Your clever little prog had a little bug-ette, which had me scratching my cranium.

Mind you, it did have me tearing apart your program to see what the hell you were doing. It taught me quite a lot.

However, my clever little Beeb was not impressed. In great expectation I banged-in RUN and got the following curt reply: Bad hex at line 470.

So I replied with a L.470 and

began to study the line. Apparently it had something to do with the EVAL("&" etc.) portion.

After pleading with my little friend to stop mucking about — all to no avail — I hit upon a brilliant idea (well, for me anyway). I politely asked for a PRINT ASC("&").

Guess what I got for a reply — 38, you berk.

Timorously I substituted "&3B" (yes, I make mistakes as well) and discovered a RUDE Kangaroo!

Anyway, I now have a good version of your bouncing marsupial safely residing between 055 and 060 on my cassette recorder.

Actually, I thought I'd

discovered a couple more faux pas. But only one was.

You forgot to insert the colon between VDU 26,12 and GOTO 180, on line 310. I subsequently tried it (for a laugh) and got "No such variable at Line 310" — I'm amused easily, you see.

The other discovery I thought I'd made was at line 300. Being of a tidy mind (if nothing else) I wondered why you had departed from the norm and left out the comma in between REPEAT and AN\$. That should have caused the REPEAT to be printed with a question mark.

So daringly I tried it. Yoiks! Every time REPEAT was printed I got a "strange"

character beside it.

Looking on page 488 of the User Guide I discovered that it looked like graphics character 63.

It took me a little while to work that one out.

Page 497 charged to my rescue. The Ascii code for a "?" is 3F — or 63, to us mortals! Oh, very clever.

Anyway, I enjoy your mag, so keep it up. One of these days I'll finish my prog to reproduce, full screen size, that little BBC Micro "vulture" that adorns my machine.

The only problem is that every month you chaps publish another copy of Micro User and interrupt me! — R. Poynter, Surbiton.

● Thanks for an interesting letter. You don't need to tell the computer to use the second processor – as soon as power to the unit is on it informs the BBC Micro of the fact. From then on the second processor is constantly on line. As for commercial programs having their memory locations changed, they only need to if they have broken the Acorn rules about directly accessing ROM routines and I/O ports.

The second processor is clocked at one and a half times the rate of the BBC Micro, and so handles its Basic at a faster rate than normal. The display is, of course, handled at the normal rate by the original processor. There is still a time-saving element though, since the Tube acts as a buffer, allowing the second processor to rid itself of those time-wasting I/O operations quickly.

Preserving a picture

COULD you please help me. I am desperately trying to find out how to SAVE a screen (picture) for recalling at a later date without saving the lines which draw it.

I have looked in every book on the Beeb I could get my hands on without much success – B. Partington, Salford.

● Your wish is our command. This month's Programmers' Workshop contains just such a routine.

That dirty word

I HAVE been microcomputing now for about a month and in that time nearly everything that I have read about my Beeb B, including your magazine, treats GOTO as a dirty four letter word. Any fool knows that it is really two words.

From the start I tried to avoid using it, instead using REPEAT... UNTIL and FOR... NEXT loops, but all the micro would return was "Too many Repeats" or "Too many Fors".

I called the damned thing a

stupid microbrained idiot but it quite unemotionally returned "No such variable." I told it to GOTO hell but the same message returned.

Rather than throw £400 worth of electronic grey matter out of the window I persevered with the mammoth 500 page manual and eventually got my loops working. So I tried procedures. "No Proc" is what I got back. I tried using Data. "Out of Data" it said.

Back to the manual, and to my surprise it actually recommended the use of "On Error GOTO n".

I am now programming quite happily, and with a little help from your magazine have taught my two-bit, sorry, 32k servant to be more friendly.

The other day it concluded a program by telling me to "Have a nice day" (in double height letters and in colour), and it even played me a short jingle in three part harmony to brighten my outlook.

Please accept £12 for a year's subscription to The Micro User, and forgive me for the moment for thinking that GOTO is a lot less bovver. – Adrian Drover, Glasgow.

● Well, Adrian, we warned you about using GOTO – be it on your own head if the structuralist boot boys pay you a visit.

The NEW look

YOUR excellent magazine is packed full of information, but please could you include a Hints and Tips page? I include some suggestions:

□ How do you include NEW in a line?

□ When using VDU5 to position characters on a specific grid how do you rub out the character? I use a space to do this, but this does not work as you can superimpose characters.

□ When you have characters on the screen which you do not want to disappear how do you draw a circle or another large shape in the background colour and then change it to the foreground colour? When I do this I accidentally change the background colour to the foreground colour.

□ Is it possible to scroll other ways other than upwards in Basic? – Peter Caswell, Wolverhampton.

● If you look at the competition winner's listing in this issue you will see a "self-destruct" routine which uses NEW from within a program in a rather crafty way.

Rubbing out characters with VDU 5 depends on using the GCOL options other than

GCOLOR. This is a complicated topic which we will cover in our graphics series.

I'm not quite sure I know what your problem is with the circle. I think you'll be able to solve it by switching colours with the VDU 19 statement.

You can scroll in different directions by careful manipulation of the 6845's registers, a topic we shall be covering in future issues.

Chance for tyros

MANY thanks for an excellent magazine. I have already learnt a great deal in just three issues.

However, as a competition fan I have been greatly disappointed by your competitions so far.

Excellent prizes but no chance of being among the winners if like me you are a BBC learner.

So how about a bit more variety, spread the prize money a little more widely, and give us all a chance. – D. Rayner, Tonbridge.

● Nobody can say that we aren't open to suggestions! If you look at this month's competition, Mr Rayner, you'll see your crossword there. Unfortunately, you won't be able to enter, will you?

Something for the teenies

I'M quite pleased with your publication but I'm disappointed with some of your reviews.

Good reviews of hardware and software are one of the most important things you can provide, but not all of yours are up to standard.

You gave Grafkey, from Clares, a half page review in your second issue, but the hard facts could have been contained in about two sentences.

I wanted to see a list of all its key features, comments as to its speed, information as to how easy it is to use the pictures drawn by it in my own programs (particularly with the disc version for the increasing

number of us who have them), and any noticeable drawbacks.

It would also be nice if the review contained information about possible future upgrades – for instance, does Clares plan to make upgrades available so that pictures can be manipulated?

I think that particularly when you are reviewing non-games programs this sort of detailed information is required for the review to serve its purpose – to tell me whether or not a particular product will meet my needs and is worthwhile purchasing.

Keep up the good work, though – I look forward to your next issue and particularly to

the Manchester Show. – Douglas Weller, Birmingham.

P.S. How about reviews and listings of programs for the very young?

● Getting the balance of reviews right is far from easy: Should we cover one in detail or several more generally?

While I disagree with you about the Clares review, I agree that utilities, word processors and the like need a deeper level of review than games.

You'll be glad to hear that we have some programs for the very young well on the way to completion. My children are testing them at present, and we'll publish them as soon as I can get them off the micro!

Joystick movement

I HAVE constructed the joystick project as per The Beeb Body Building Course, (May issue).

I used the Radio Spares assembly, and although it works I find that I have to adjust it for every different game and on Rocket Raider I can't get sufficient movement on it at all.

Is there any cure for this? — Richard Taylor, Fishal.

● When I wrote the article the only game supporting joysticks was Snapper, and there was just about enough movement available on the joystick for this.

The only cure is to arrange that the "hot" end of the joystick be taken to a higher voltage than the 5 volts recom-

mended in the article.

Unfortunately the A/D socket has only a maximum of 5 volts available. The simplest solution would seem to be to boost this voltage by connecting one or two batteries in series with the 5 volt supply (see diagram).

Due to the mechanical restrictions of the Radio Spares joystick, you will never be able to apply more than the absolute maximum of 5.3 volts to the A/D input.

However you should be careful during adjustment never to exceed this. If you do, you may damage the A/D converter and a new one will cost you £5.

With the extra voltage it is possible to cover the full range with the restricted movement of this type of joystick.

Remember to disconnect the joystick before turning the com-

puter off as the battery would try to power your computer with a reverse voltage.

While probably not doing any harm, it does neither the computer nor the battery any good. Best of luck through the maze at the end of Rocket Raider — Mike Cook.

Planning ahead

AS new owners of a BBC Micro we are pleased with your new magazine, and have taken out a subscription.

I would like to offer the following suggestions for future contents:

● *A children's page, to include very simple and clearly presented programs which younger children and teenagers can type and run themselves — with, possibly, things to do based on the program.*

● *A cumulative index about every six months.*

● *Designs for a trolley on which to keep the computer, leads, etc., which is suitable for*

use with an ordinary chair, not necessarily to accommodate a TV as well, for making in readily available DIY materials!

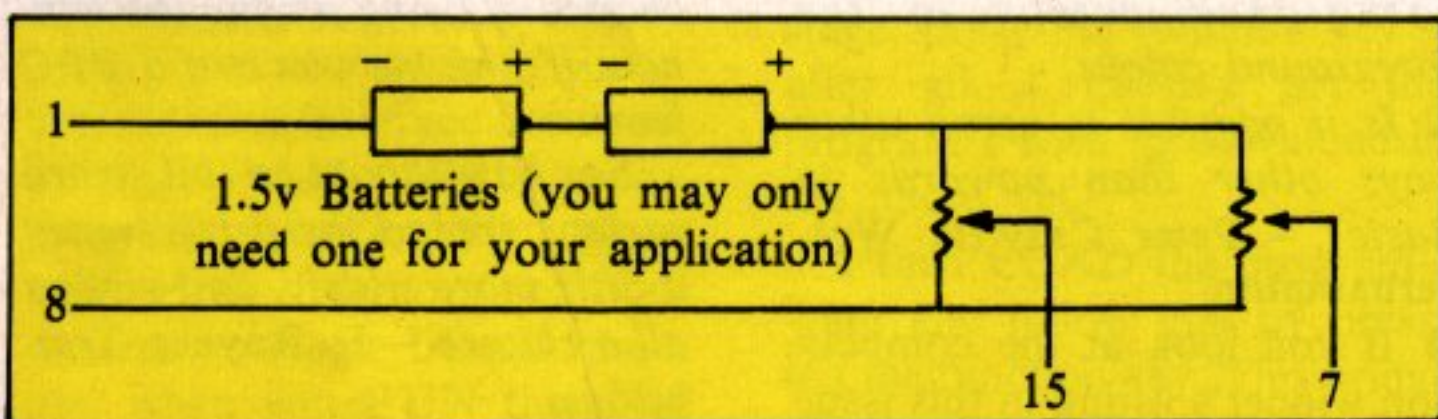
● *Programs available commercially, to be "consumer tested" by various age groups, including children and non-experts, for reviews.*

● *Reports on various brands of TV (including rental) as to compatibility with micro — we have had quite a lot of trouble with this problem.*

Mrs J.M. Summersgill, Troon.

● A children's page is under consideration, but I'm a bit wary. Most of the children I know seem to spend 10 minutes playing with the micro then start to reel out programs far beyond anything I can imagine.

An index is a nice idea, as is the trolley. In fact my wife wishes to make a special plea for some DIY-inclined reader to design a workstation or desk for my disc-based system. The TV compatibility problem is a new one to me. Are any other readers experiencing difficulties in this area?



And finally, with tongue firmly in cheek . . .

Missive from a faint-hearted micro user

Dear Trev,

Sorry I've not written for so long, but I've spent most of my spare time and all of my nervous energy looking for a cassette player that my Beeb will actually talk to. The one I have at home won't work, and neither will my neighbour's.

The damn thing is a snob. Apparently it won't hold a conversation with anything costing less than £20.

Mind you, I wouldn't mind paying twice that if I could find one that would work and initiate me into the mysteries of the "Welcome" cassette I found in the box during my fruitless search for the cassette leads. Of course, there's no advice in the manual about which cassette player will work with the Beeb — for £400 what else can you expect?

Ignoring Andrea's obvious delight at my predicament I began ringing round the computer shops for advice. Central Processors did give me the details of a model that would work, a Frodsham GP02.

"Where can I get it?" I asked
"You can't, they don't make it any more," came the reply.

"Well, do you know of any others that work with the Beeb?"

"No, but we've sold 40 micros this week and someone is bound to find a compatible model and let us know. Ring in a week's time."

He obviously didn't know A. There was no way I could sit around with £400 of under-utilised microprocessor enduring her scorn.

So I began a fruitless search of the shops of the city, the en-

quiries going something like this: "Er, excuse me, have you got a cassette recorder?" I would ask.

"Certainly sir," and they would produce a two-storey ghetto blaster.

"No, I mean just a cassette player, no radio."

"No, sorry, all sold out. People keep buying them," the last said in a vaguely embittered tone. "Kids buy them for those computer things."

"Oh well, I don't suppose you know of a make that will work with the Beeb?"

"Yes, that'll be the Frodsham GP02, but you can't get them now, we've sold out and they don't make them any more."

"Why not?"

"There's a recession on."

Maybe Frodsham's didn't like to be the odd one out, a firm

with a product that sold!

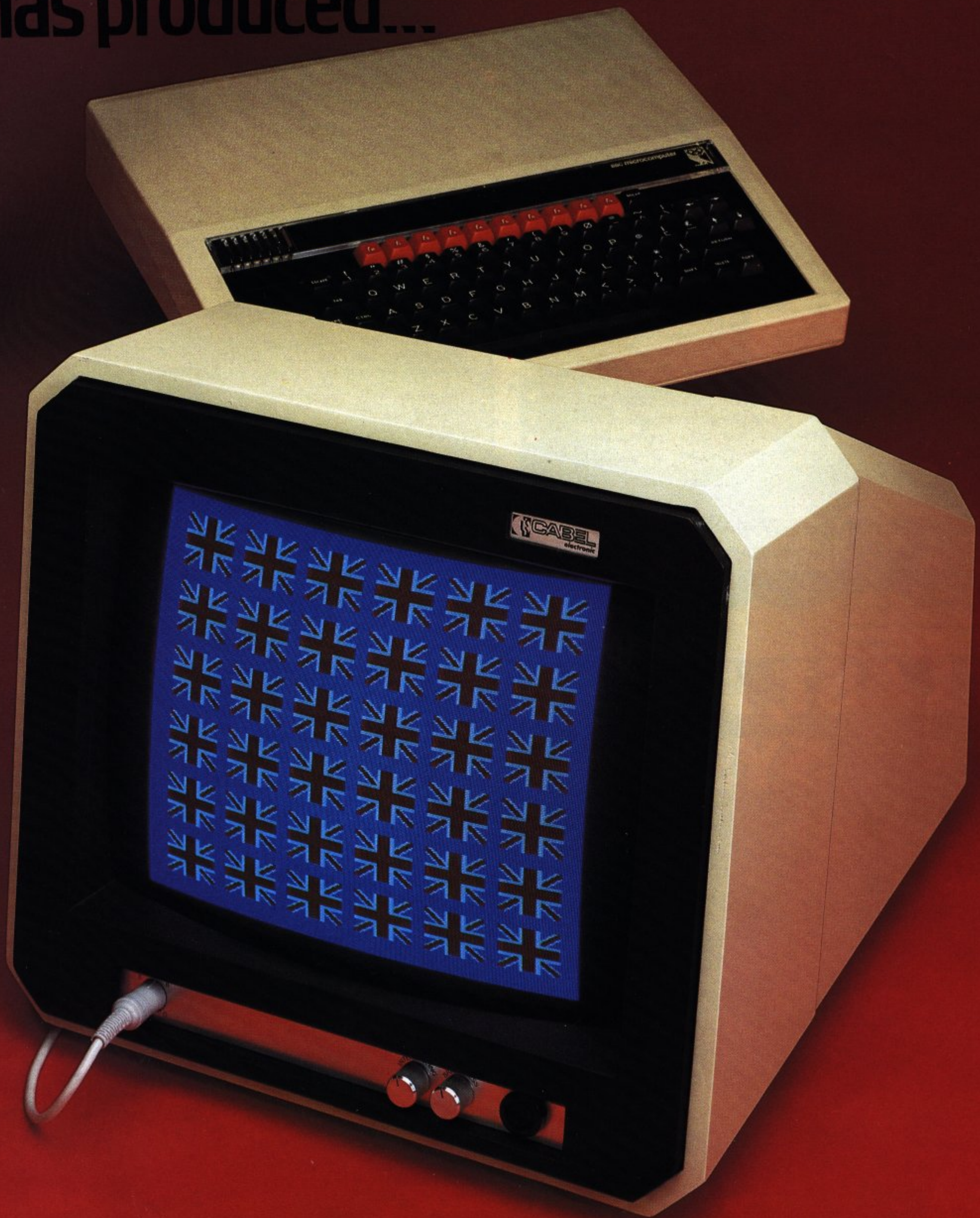
So my lonely search goes on. Why won't anyone print a list of compatible cassette players, and why do people stop making them when it's found they work with the Beeb? Is it some form of plot by a multinational computer firm to smother the British micro industry? In my more paranoid moments I imagine A going round buying up the last stocks of Frodsham GP02s just to frustrate me.

That's all for now, must resume the hunt!

Cheers, Bob.

P.S. Good news! Central Processors have told me the address of a man who's been electrocuted by trying to interface his Beeb with an electricity sub-station. I'm off to make his widow an offer for his Frodsham GP02.

**Style and sophistication
combined with modern technology
has produced...**



**A 14" British colour monitor at a price
you really can afford. £199.50 plus VAT.**

CABEL
electronic

19 High Street, Tewkesbury, Gloucestershire GL20 5AW
Telephone: 0684 298840 Telex: 339671 ALD FAB

northern computers

micro computer systems for all applications

education and training division

location



For Educational and Training Institutions only:

Apple II, III
BBC (Free Econet Interface).
Newbrain
Green Monitors £79
Colour Monitors £199
Seikosha Printers £207
Epson Printers £349
NETWORKS
Coming soon:
Acorn Electron

we supply everything to meet the requirements of secondary schools, colleges and universities, whether it be small B.B.C. computers, Apple IIe computers, or Apple III school administration and accounting systems.

please contact: Gareth Littler or David Horsfall
EDUCATION & TRAINING DIVISION

Northern Computers, Churchfield Road,
FRODSHAM, CHESHIRE WA6 6RD Tel: (0928) 35110

ADVERTISERS INDEX

A&F Software	2	Kansas City	70-71
Acornsoft	3	Key Computers	41
AMS	16	Kingsley	90
Andrew Whyte	47	Kosmos	87
ASD	75	Level 9	90
BS Dollamore	110	MP Software	98
Beebdex	102	Micro-Aid	90
Bourne	50	Microadvent	89
C Tech	36	Micro Management	78-79
Cabel Electronics	109	Micronet 800	97
Challenge Games	87	Micropower	69, 111
Clares	35, 103	Microspares	74
Compusoft	87	Microwave	74
Computer City	111	Midwich	37
Computer Concepts	27	Musicsoft	89
Computerama	21	Newark Video	34
Contex Computing	100	Northern Computers	98, 110
Cumana	23	Oakleaf Computers	92
DA Computers	94	Opus Supplies	62
DACC	100	PJ Microsystems	98
Datatech	89	Pace	6
Digital Fantasia	24	Paen Systems	100
Dimension Software	94	RMK Electronics	100
Dr. Soft	92	Robocom	89
Electronequip	75	SP Electronics	102
Eltec Computers	66	Sherston Software	100
Everyday Electronics	89	Silicon Centre	92
Fairhurst	87	Simon W. Hessel	29
Format	90	Simonsoft	74
Gaelsett	34	Squirrel Software	89
Ganymede Systems	74	Statacom	92
Gemini	32-34	Superior Software	8
Glengary-Soft	100	Synergy Software	51
Golem	94	Technomatic	13
Graftek Electronics	102	Twilstar	98
Hexagon Software	94	Walters	65
Home & Business	65	Watford Electronics	14-15
Ikon	68		

AT LAST, A COMPLEX GRAPHICS SYSTEM, THAT'S SO EASY TO OPERATE ..IT'S CHILDS PLAY P.L.DIGITISER SYSTEM™

The PL Digitiser System enables you to reproduce complex pictures and diagrams, or produce original designs, quickly, easily and accurately.

The package consists of the 'Graphics Digitiser' incorporating a tracing pad (mapped out by rectangular grid) 256mm x 205mm and the 'Control Program' (Tape or Disc). This includes such features as automatic parallel, vertical, horizontal or diagonal lines, construction of boxes and circles from two probe positions, free hand draw, fill and outline, move and scale, immediate edit and the ability to save completed screens as files or reproduce by line printer.



B.S.DOLLAMORE LTD.

U.K. Distributor **LM** Scientific House, Bridge St.,

Sandiacre, Notts. Telephone: (0602) 394000.

£130.39
PLUS VAT

COMPUTER CITY

THE COMPUTER CAPITAL OF THE NORTH

78 VICTORIA ROAD, WIDNES, CHESHIRE. 051-420 3333

DISC DRIVES (including Disc Utilities and Manual)
Pace Single 100K Drive £212.25
Pace Twin 100K Drive £388.00
Acorn Twin 400K Drive (80 Track) £804.00
Torch Twin 400K + Z80 & 64K £897.00

SPECIAL OFFERS

PRINTERS
Seikosha GP100A (including free 'Screen Dump' Program) £219.00
Seikosha GP250X £270.00
Epson RX80 £319.00
Epson FX80 £455.00
Smith Corona TP/1 (Daisywheel) £489.00

MONITORS
Microvitec 14" Colour Monitor £287.50
Sanyo Green Monitor £89.00
Sanyo 14" Colour Monitor (Composite) £269.00

BBC
BBC Model B £399.00
BBC Model A £299.00
BBC Model A + 16K £338.30
BBC Model A + 16K & VIA £345.00

Carriage charges on Micro's, Monitors, Disc Drives and Printers £9.00

BUG-BYTE SOFTWARE

Space Pirates £8.00
Space Warp £9.00
BBC Dragon Quest £11.50
BBC Fruit Machine £5.50
BBC Chess £8.00
BBC Backgammon £8.00
BBC Multifile £15.00
Space Invaders £7.50
Galaxy Wars £7.50
City Defence £7.50
Synthesizer £9.50
Sea Lord £7.50

A & F SOFTWARE

Lunar Lander £6.95
Planes £8.00
Tower of Alos £6.95
Frogger £8.00
Pharaohs Tomb £8.00
Painter £8.00

BBC

Home Finance £10.00
Early Learning £10.00
Music £10.00
The Computer Prog. (Vol. 1) £10.00
The Computer Prog. (Vol. 2) £10.00
Painting £10.00
Drawing £10.00
Games of Strategy £10.00
Fun Games £10.00

SUPERIOR SOFTWARE

Galaxians £7.95
Centipeds £7.95
Invaders £7.95
Space Fighter £7.95
Alien Dropout £7.95
Fruit Machine £7.95
Frogger £7.95
Road Runner £7.95

DIGITAL FANTASIA

ADVENTURE GAMES FOR THE BBC

Inc. VAT

The Golden Baton (A/B) £10.30
The Time Machine (A/B) £10.30
Arrow of Death (Pt 1) (A/B) £10.30
Arrow of Death (Pt 2) (A/B) £10.30
Escape from Pulsar 7 (B) £10.30
Circus (B) £10.30
Feasibility Experiment (B) £10.30
The Wizard of Akryz (B) £10.30
Perseus and Andromeda (B) £10.30
Ten Little Indians (B) £10.30

CS

Star Trek/Candy Floss £6.50
Hangman £4.50
Super Hangman £4.50
Beep Beep £4.50
Beebmunch £6.50
Mutant Invaders £6.50
3D Maze £4.50
Model A Invaders £5.50
Model B Invaders £7.50
Word Pro £10.50
Atlantis £7.50
Flags £4.50
Hyper Drive £6.50
Strato Bomber £7.50
Leap Frog £7.50
5-a-Side Soccer £7.50
Pontoon and Patience £7.50

WORD PROCESSING

Wordwise £45.00
View £59.00

CREDIT FACILITIES

Ask about instant credit up to £1,000. Choose the credit to suit you. The deposit is only 10% of the cost of your purchase.

We are credit brokers for Lombard Tricity Finance Ltd. Interest is just 2.25% per month, equivalent to an annual percentage rate of 30.6%. Ask for a written quotation today!

COMPUTER CITY Dept G. FREEPOST (No Stamp Required)
78 VICTORIA ROAD, WIDNES, CHESHIRE WA8 7RA.

MICROPOWER

Moonraider (B) £7.99
Swoop (B) £7.99
Alien Destroyers (B) £7.99
Galactic Commander (B) £7.99
Timetrek (B) £7.99
Laser Command (B) £7.99
Spacemaze (B) £6.85
Astro Navigator (B) £5.70
Maze Invaders (B) £5.70
Startrek £5.70
Filer £10.30
Constellation (B) £6.85
Disassembler £6.85
Micro Budget £6.85
Killer Gorilla (B) £7.99
Croaker (B) £7.99
Chess (B) £7.99
Chess £5.70
Barrage (B) £7.99
Footer (B) £7.99
Labyrinths of Lacoshe (B) £7.99
Adventure £7.99
Painter (B) £6.85
Cowboy Shootout (B) £6.85
Munchyman £6.85
Caveman Adventure £6.85
Seek £6.85
Eldorado Gold (B) £6.85
Roulette (B) £5.70
Reversi 1 £5.70
Reversi 2 (B) £5.70
Yahtzee (B) £5.70
Wall (B) £5.70
Mastermind £4.55
Draw £10.30
Where £6.85
Chemistry £6.85
World Geography £6.85
Junior Maths Pack £6.85
Physics 6.85

ACORNSOFT

Business Games £9.95
Tree of Knowledge £9.95
Peeko - Computer/Manual £9.95
Algebraic Manipulation £9.95
Creative Graphics Cassette* £9.95
Graphs & Charts Cassette* £9.95
Desk Diary/Manual £9.95
Lisp Cassette* £16.85
Forth Cassette* £16.85
Philosophers Quest £9.95
Sphinx Adventure £9.95
Castle of Riddles £9.95
Monsters £9.95
Snapper £9.95
Planetoid £9.95
Arcade Action £11.90
Rocket Raid* £9.95
Meteors £9.95
Arcadians £9.95
Sliding Block Puzzles £9.95
Cube Master £9.95
Super Invaders £9.95
Missile Base £9.95
Starship Command £9.95
Countdown/Doom £9.95
Snooker £9.95

LEVEL 9 COMPUTING

ULTIMATE ADVENTURES

Colossal Adventure £10.00
Adventure Quest £10.00
Dungeon Adventure £10.00
BBC Forth £15.00
BBC Forth Tool Kit £15.00

SQUIRREL SOFTWARE

BBC
Supergolf £7.50
Bun Fun £6.50

SPECIAL OFFER

ORDER 2 CASSETTES - DEDUCT £1
ORDER 3 CASSETTES - DEDUCT £2 etc.

BOOKS FOR THE BBC MICROCOMPUTER

1 30 Hour Basic (NEC) £5.50
2 Programming the BBC (Newnes) £6.50
3 Easy Programming for the BBC Micro (Shivas) £5.95
4 Let Your BBC Micro Teach You To Program (Interface) £6.45
5 Assembly Language Programming for BBC (MacMillan) £8.95
6 BBC: An Expert Guide (Granada) £6.95
7 The BBC Micro Revealed (Interface) £7.95
8 Programming the 6502 (Sybex) £10.75
9 Advanced 6502 Programming (Sybex) £10.25
10 Machine Code for Beginners (Sybex) £5.95
11 Practical Programs for BBC and Atom (Wiley) £5.95
12 30 Programs for the BBC Micro (Evans) £4.95
13 Games BBC Computers Play (Addison Wesley) £6.95
14 The Book of Listings (BBC Publications) £6.75
15 The Computer Book (BBC Publications) £6.75
16 Creative Graphics (Acornsoft) £7.50
17 Graphs and Charts (Acornsoft) £7.50
18 Forth Manual (Acornsoft) £7.50
19 Lisp Manual (Acornsoft) £7.50

P & P on Books £1.

TRADE ENQUIRIES WELCOME.
SPECIAL DEALS FOR SCHOOLS.

MAIL ORDER



THE COMPUTER CAPITAL OF THE NORTH - SUPPLYING **BBC** MICROCOMPUTERS
NATIONWIDE FOR EDUCATION, BUSINESS AND LEISURE

ANOTHER FABULOUS B.B.C. PROGRAM FROM BRITAIN'S LEADING SOFTWARE HOUSE

Killer Gorilla

Once again, Killer Gorilla holds captive a young and beautiful heiress. Is the age of CHIVALRY dead? Answer the maiden's cries for help and scale the ironwork tower. Race along Girders, Climb Ladders, Jump Gaps, Leap onto moving Elevators and Career along Conveyors. Dodge or jump the rolling barrels or grab a hammer and smash a few. Watch out for the fireballs and iron beams hurled with animal passion. Sensational, full feature machine code arcade game with four phases, increasing difficulty and speed, bonus points and the highest standard of graphics yet achieved on the BBC micro. Only £6.95



Other programs available: Swoop (B) £6.95/ Croaker (B) £6.95/Chess (B) £6.95/Laser Command (B) £6.95/Galactic Commander (B) £6.95/Filer £8.95/Timetrek (B) £6.95/ Micro Budget £6.95/Moonraider (B) £6.95/ Barrage (B) £6.95/Beebmon (B) £6.95/The Labrynth of La Coshe (B) £6.95/Draw (B) £8.95/World Geography (B) £5.95/ Spacemaze (B) £5.95/Munchyman £5.95/ Seek £5.95/Eldorado Gold (B) £5.95/ Disassembler £5.95/Constellation (B) £5.95/ Junior Maths Pack (B) £5.95/Where? (B) £5.95/Painter (B) £5.95/Chemistry (B) £5.95/ Physics (B) £5.95/Caveman Adventure (B) £5.95/Astro Navigator (B) £4.95/Startrek £4.95. Reversi 1 £4.95/Reversi 2 (B) £4.95/Roulette (B) £4.95

Written any Programs? We pay 20% Royalties for B.B.C. & ELECTRON PROGRAMS

WE Guarantee THAT ALL OUR ADVERTISED PROGRAMS HAVE BEEN COMPLETED AND ARE READILY AVAILABLE

WE ARE AUTHORISED DEALERS FOR ACORN ATOM, BBC MICRO & DRAGON 32

SPECIAL OFFER

Deduct £1 per cassette when ordering two or more.

MICRO POWER LTD.
Dept. BMU 7
8/8a REGENT STREET,
CHAPEL ALLERTON,
LEEDS LS7 4PE
Tel: (0532) 683186 or 696343

Please add 55p order P & P + VAT at 15%

Please Note:

All programs are now available at all good dealers or direct from MICRO POWER LTD.

